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APPENDICES

CONSENT DECREE FOR SETTLEMENT BETWEEN
THE UNITED STATES OF AMERICA
AND WASHINGTON NATURAL GAS COMPANY

NO. C89-155TB
(CONSOLIDATED WITH C89-489TB
& C90-5373B)

5604

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON

RECORD OF DECISION, DECISION SUMMARY AND RESPONSIVENESS SUMMARY

FOR

FINAL REMEDIAL ACTION
COMMENCEMENT BAY - NEARSHORE/TIDEFLATS
TACOMA TAR PITS SITE
TACOMA, WASHINGTON
DECEMBER 1987

APPENDIX A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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FOR

FINAL REMEDIAL ACTION
COMMENCEMENT BAY - NEARSHORE/TIDEFLATS
TACOMA TAR PITS SITE
TACOMA, WASHINGTON
DECEMBER 1987

RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION
FINAL REMEDIAL ACTION
COMMENCEMENT BAY - NEARSHORE/TIDEFLATS
TACOMA TAR PITS
TACOMA, WASHINGTON

RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

Site

Commencement Bay - Nearshore/Tideflats, Tacoma Historical Coal Gasification site: Commonly known as Tacoma Tar Pits Site - Tacoma, Pierce County, Washington

Purpose

This decision document presents the selected final remedial action for the site, developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and consistent with (where not precluded by SARA) the National Contingency Plan (NCP, 40 CFR Part 300). The State of Washington has been consulted and has verbally concurred with the selected remedy. Formal concurrence of the state is expected shortly after this decision document is signed.

Basis for Decision

The decision is based upon the administrative record for the site, as obtained from the files of the U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology. This record includes, but is not limited to, the following documents:

- Remedial Investigation Report for the Tacoma Tar Pits, Tacoma, Washington (September 1987)
- Feasibility Study of the Tacoma Historical Coal Gasification Site, Final Report (October 1987)
- Risk Assessment of the Tacoma Historical Coal Gasification Site - Final Report (July 1987)

- Decision Summary of Remedial Alternative Selection (attached)
- Responsiveness Summary (attached as Appendix II)
- A complete list of documents contained in the Administrative Record is included as Appendix I
- Staff summaries and documents

Description

This record of decision addresses source control of on-site contamination through excavation of contaminated soils and stabilization of these contaminated soils in a polymer/cement matrix. The stabilized matrix will be capped to reduce surface-water infiltration. Management of migration is addressed by diversion of surface-water runoff. On-site shallow groundwater contains detectable concentrations of contaminants. However, because contamination has not been detected off-site and as the remedial action is expected to prevent further contamination, groundwater extraction and treatment is not considered as appropriate at this time. Should monitoring indicate contamination migration, further treatment may be necessary, to address the shallow groundwater.

The remedial action is designed to:

- Excavate and treat all contaminated soils considered to be Extremely Hazardous Wastes (EHW) defined for this site as exceeding 1 percent total polynuclear aromatic hydrocarbon;
- Excavate and treat (stabilize) all surface soils (<3 feet) containing contaminants that exceed a 10^{-6} lifetime cancer risk level;
- Reduce surface water infiltration and potential human exposure to stabilized soils by capping the stabilized matrix with asphalt;
- Reduce surface water transport of contaminants by channeling and managing surface waters; and
- Provide for continued groundwater monitoring to evaluate the effectiveness of the remedial action and the need for groundwater extraction and treatment;
- Remove and treat ponded water to achieve cleanup goals.

Treatment will be sufficient to reduce contaminant levels in the soils, and surface waters to or below cleanup standards. Numeric values for these cleanup standards and the criteria used in performance standard development are presented in Table 1. Treatment should be permanent, and should effectively reduce the toxicity and mobility of the contaminants. Performance levels are not to be exceeded during the operational life of the remedial action.

Although Table 1 contains cleanup standards for groundwater the remedial action does not currently provide for groundwater extraction and treatment. Source control measures are expected to reduce contaminant concentrations in the local groundwater system. Ground water monitoring performed during implementation and following the remedial action will aid in determining the effectiveness of the remedial action. If cleanup levels are not achieved at the site boundary in the aquifers within a reasonable period of time following completion of the remedial action, an alternative remedial action will be evaluated and implemented which may include groundwater extraction.

Continued monitoring of surface waters will also be performed to ensure cleanup levels are met during and following implementation of the remedial action. Treated water discharge shall at all times be of quality consistent with U.S. and Washington State laws.

Institutional controls such as deed restrictions to prohibit excavation or drilling will be developed, consistent with the final design, to ensure that the remedial action will continue to protect human health and the environment.

In compliance with SARA the effectiveness and performance of this final remedial action will be reassessed at regular intervals, not to exceed 5 years.

Table 1. Cleanup Goal Performance Standards

Maximum Allowable Contaminant Concentrations

Tacoma Tar Pits Site

Contaminant or Contaminant Class	Soils (mg/kg)	Surface Water, Boundary (ug/l)	Surface Water On-Site (ug/l)	Groundwater (sand and fill aquifers) (ug/l)
Lead	166[2]	3.2[4]	172[7]	50[8]
Benzene	56[3]	53[5]	5,300[7]	53[5]
PCBs	1.0[3]	0.2[4]	2[7]	0.2[4]
PAHs[1]	1.0[3]	5 - 30[6]	219[7]	5 - 30[6]

(1) Included are benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-c,d)pyrene.

(2) Acceptable dose.

(3) 10^{-6} Risk Level.

(4) Chronic freshwater ambient water quality criterion. Performance based on detection limit.

(5) Acute freshwater ambient water quality criterion x 1/100.

(6) Estimated range of chronic freshwater ambient water quality criterion based on marine criteria.

(7) Estimated acute freshwater ambient water quality criterion.

(8) Drinking Water MCL.

Declaration

Consistent with CERCLA, as amended by SARA, and the NCP, it is determined that the selected remedy as described above is protective of human health and the environment, attains Federal and State requirements which are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the preference expressed in SARA for treatment that reduces toxicity, mobility, and volume. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

12-30-87
Date

Regional Administrator
Environmental Protection Agency
EPA - Region 10

DECISION SUMMARY
REMEDIAL ALTERNATIVE SELECTION
FINAL REMEDIAL ACTION
TACOMA TAR PITS
TACOMA, WASHINGTON

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I INTRODUCTION

The Tacoma Tar Pits site is part of the Commencement Bay - Nearshore/Tideflats Superfund site located within the Tacoma Tideflats industrial area near Commencement Bay. A coal gasification plant was in operation on site from 1924 through 1956. A metal recycling facility has been operating on the site from 1967 to the present. Preliminary investigations were conducted at this site between 1981 and 1983 to determine if contaminants were present on site at levels that were a potential threat to human health and the environment.

As a result of the preliminary investigations and the detection of a variety of contaminants in both soils and water, the U.S. Environmental Protection Agency (EPA) identified the need for further investigations performed according to guidelines established by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended in 1986 by the Superfund Amendment and Reauthorization Act (SARA). The purpose of this Decision Summary is to summarize:

- The nature and extent of contamination
- The pathways of contaminant migration
- Rates of contaminant transport
- Risk associated with potential on-site and off-site exposures
- The method for establishing site cleanup standards
- The method of remedial alternative development
- The methodology for evaluation of remedial alternatives
- The results of the detailed evaluation of alternatives
- The preferred remedial alternative
- The enforcement status of the site
- The opinions and acceptance of the preferred alternative by the community.

The Decision Summary is designed to present technical information needed to support the Record of Decision.

Several companies have either previously owned land at the site or currently own or operate on land at the site. Collectively these companies are termed Potentially Responsible Parties (PRP). With guidance and oversight by the EPA and Washington State Department of Ecology (Ecology), several PRPs have undertaken and completed a Remedial Investigation (RI), a Risk Assessment (RA), and a Feasibility Study (FS) for the Tacoma Tar Pits site. EPA and Ecology have found these documents to be acceptable although EPA has prepared an addendum for each document addressing issues that the studies have inadequately or incompletely addressed.

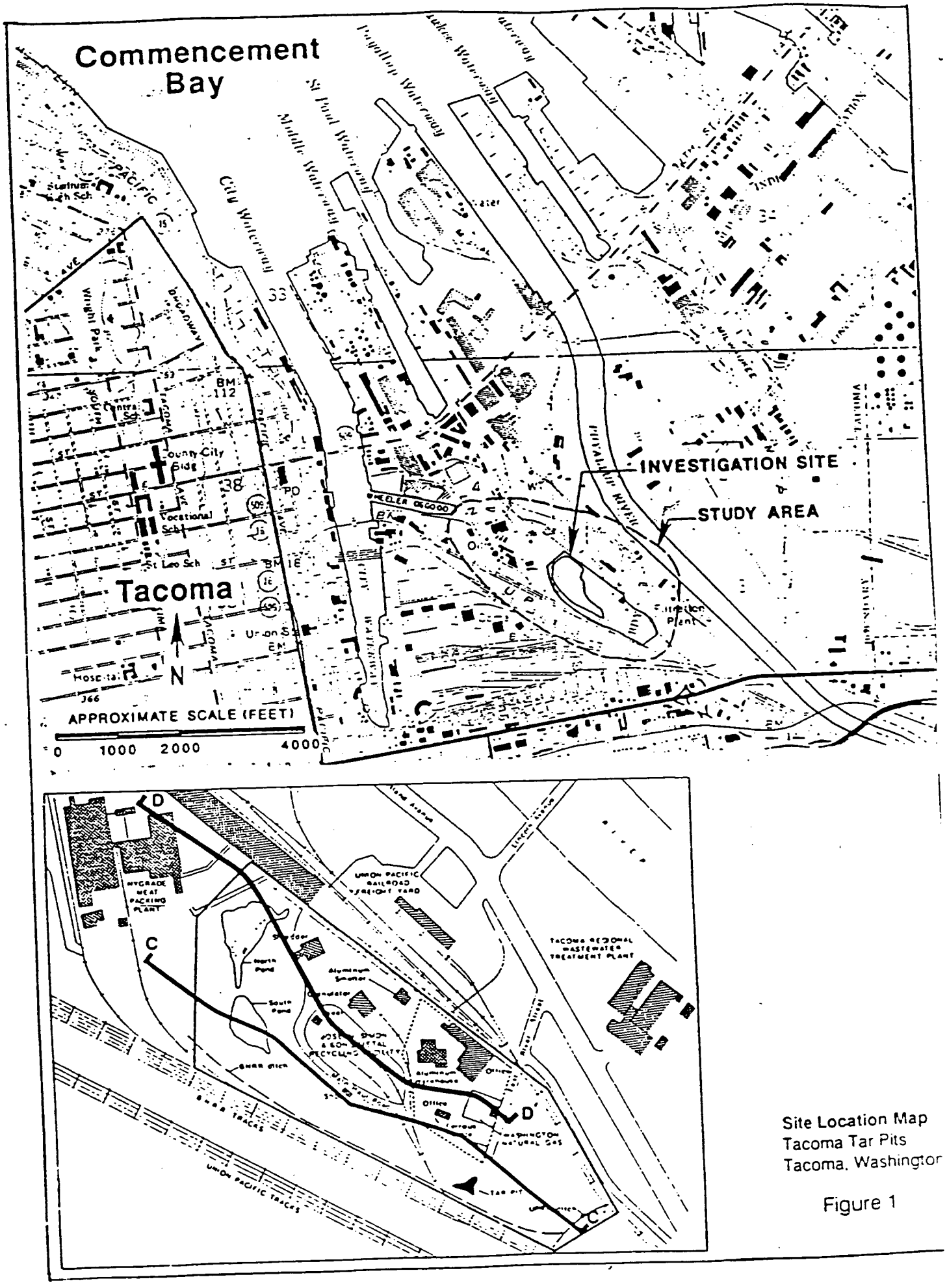
II SITE DESCRIPTION AND LOCATION

The Tacoma Tar Pits site covers an area of approximately 30 acres within the Commencement Bay – Nearshore/Tideflats site, an area of approximately 9 square miles which includes Commencement Bay, seven urban waterways, shoreline areas along the southeast side of Commencement Bay, and the Puyallup River delta. The site lies between the river and the City and Wheeler-Osgood Waterways. As shown in Figure 1, the site is bordered by Portland Avenue and St. Paul Avenue on the north, by East River Road on the east, by East 15th Street on the west, and by Burlington Northern Railroad tracks to the south.

A variety of industries are located on or adjacent to the site. The study area currently contains a metal recycling facility (Joseph Simon and Sons), a natural gas transfer station (Washington Natural Gas), a rail freight loading yard (Union Pacific Railroad), a meat packing plant (Hygrade Food Products), and a railroad switching yard (Burlington Northern Railroad).

The site currently contains two ponds, a small tar pit, and various surface-water drainage ditches. The metal recycling facility contains stockpiles of scrap metal and shredded car interiors. The area is generally flat with local variations in relief of 2 to 5 feet. The present topography has resulted from modifications to the land surface by dredging, filling, and grading activities. Ground elevations generally range from +8 to +12 feet (Mean Sea Level), with higher elevations resulting from stockpiles of shredded car interiors and scrap metal.

The study area is located near several major surface water bodies including the City and Wheeler-Osgood waterways, the Puyallup River, and Commencement Bay. Although none of these water bodies are used for water supply, the bay and river do support extensive fish and shellfish



Site Location Map
Tacoma Tar Pits
Tacoma, Washington

Figure 1

populations. Several portions of Commencement Bay have been identified as being severely contaminated, resulting in adverse biological effects.

In addition to concerns on the site's impact on surface water quality, contamination of the local groundwater resource is also of concern. Many local industries use groundwater from on-site wells in spite of the fact that potable water from the City of Tacoma is available. Most of these wells are screened at depths of greater than 400 feet. No water supply wells were identified in the uppermost aquifers investigated by the RI and no domestic water supply wells are located in the immediate vicinity of the site.

III SITE HISTORY

A. Site Operations/Disposal History

In 1924 a coal gasification plant was constructed on the site. The plant was also sold in 1924 and continued to operate until 1926 when the property was sold again to Washington Gas and Electric Company. Waste materials from the coal gasification process were disposed of on site. These materials included coal tar liquors, coal ash, and coal tars. These substances by definition contain a wide variety of organic compounds and heavy metals. Many of these organic compounds are toxic and several are considered to be carcinogenic. These compounds include aromatic hydrocarbons (i.e., benzene, toluene), polynuclear aromatic hydrocarbons collectively known as PAH's (i.e., naphthalene, benzo(a)pyrene), as well as numerous other classes of hydrocarbons and cyanide. Heavy metals which are relatively common in such waste streams include arsenic, mercury, and lead.

In 1956, the plant's production of coal gas was terminated due to the availability of natural gas. At this time, Washington Gas and Electric Company merged with Seattle Gas Company to form Washington Natural Gas Company, a distributor of natural gas. Although coal gas production ceased, the plant remained intact until 1965. At that time, dismantling of the plant began. Demolition was completed by 1966. Most metal structures were removed from the site; however, all demolition debris and below grade structures were left in place. Such structures included tanks and pipelines containing tars.

In 1967, a metal recycling company (Joseph Simon and Sons) began operation at the site. A small portion of the property (0.3 acres) was retained by Washington Natural Gas Company. Fill material consisting of scrap

iron, car bodies, soil, and shredded car interiors were used to fill the western and southern portions of the site. This facility recycled a variety of metals largely from automobiles and transformers. Automobiles were disassembled and materials sorted and processed. The recycling of automobile batteries introduced both acid and the heavy metal lead to the soil. Prior to scrapping, transformers were drained of their oil. During the time period in question, these oils typically contained polychlorinated biphenyls (PCBs).

The Hygrade property originally was owned and operated by Carstens Packing. Little has been changed since the original construction of the Carstens Packing complex in the early 1900's. Hygrade purchased the plant and property from Carstens Packing in 1979. In about 1965, the eastern half of the Union Pacific Railroad property was filled, a freight house constructed, and the surrounding area paved.

The area east of East River Street remained undeveloped until after 1970. The area has been filled and leveled for possible warehouse construction.

B. Regulatory History - Previous Investigations

In 1981, EPA analyzed aerial photographs of the site as part of their evaluation of the Commencement Bay tidal flats area and found evidence of a pond that potentially contained waste materials. In 1981, the Washington State Department of Ecology (Ecology) conducted an inspection of the Joseph Simon and Sons property, noting runoff contained a considerable amount of oily material. A tar sample was collected from the tar pit and was found to contain 4 percent PAHs and 240 ug/l phenol.

In 1982, the EPA Field Investigation Team (FIT) conducted a perimeter inspection of the site, and the results were used together with historical information to complete a EPA Potential Hazardous Waste Site Preliminary Assessment. This assessment concluded a potential hazard to the environment existed due to the presence of oils, grease, phenols, PAHs, heavy metals, and unknown chemicals.

Following the FIT investigation, the EPA requested that the property owners conduct a preliminary investigation to assess the severity of contamination. This study consisted of a data review, a hydrogeologic investigation, and the collection and analysis of soils, surface waters, groundwaters, and tars. The report from this study was issued in May 1983. In addition to contaminants derived from the coal gasification process, lead and PCBs were detected.

In September 1983, another site inspection was performed by EPA and Ecology and in the same year, the EPA issued a final report entitled, "Tacoma Tar Pit Scope of Work," which contained investigative work elements necessary to complete a RI. In 1984, the EPA prepared a Final Work Plan and in September 1984, initiated RI activities. Shortly after the EPA investigation was initiated, agreement was reached with several PRPs and a Consent Order was signed allowing these PRPs to conduct the RI/FS. The PRP investigations commenced in November 1984.

C. The Remedial Investigation

The purpose of the RI was to determine the types of waste materials that were present on site, the composition of these wastes, the extent to which waste materials were distributed over the site, and the extent of migration of toxic compounds from the waste materials. In addition to defining the nature

and extent of contamination, the RI was designed to characterize site geology and hydrology to evaluate mechanisms and rates by which toxic compounds may be transported from the site to potential receptors. The RI also examined the potential for airborne transport of site contaminants. The RI was performed in several phases with intermediate reports reviewed by EPA and Ecology. The final RI document was submitted to the EPA in September 1987. EPA and Ecology have prepared an addendum to this report to identify and discuss issues that were not fully addressed or investigated by the RI.

1. Site Contaminants

Based on the results of previous investigations, a variety of waste materials were anticipated to be present on-site. These materials included:

- Organic compounds derived from coal tar including PAHs, volatile organics, aliphatic hydrocarbons, cyanide, sulfite, phenols, and heterocyclic compounds of sulfur, oxygen, and nitrogen.
- Ash from coal carbonization
- Coal residue
- Shredded car interiors containing metal, oil, grease, plastics, and synthetics fibers
- Animal fat or animal byproducts
- Heavy metals
- PCBs
- Pesticides, herbicides, and rodenticides.

To maximize the efficiency of the RI, the investigation was divided into ten subtasks comprised of:

- Project management
- Research of available records
- Site features investigation
- Hazardous waste investigation
- Hydrogeologic investigation

- Surface-water investigation
- Air quality investigation
- Biota investigation
- Bench and pilot tests
- Public health and environmental concerns

No bench or pilot studies have been performed to date, these being left until the Remedial Design is commenced, and the final task was redirected to evaluate contaminant transport pathways. With these exceptions, the RI was executed in its entirety.

2. Soil

The RI included the drilling of 32 soil borings, excavation of 13 backhoe pits, and analysis of soil samples for a variety of toxic contaminants. Organic compounds and other tar-related contaminants were found in soils at locations known to contain coal gasification wastes. In most locations where organic contaminants were detected, there existed physical evidence (i.e., staining, odor) of tar materials.

Coal Gasification Wastes

Coal tar and other coal gasification wastes are known to be present in three site locations: the tar pit, the North and South Ponds, and in an area of tar boils. Coal tar most likely occurs in a thin layer within these historic waste emplacements. Coal tar in the ponds is 1 to 3 feet thick and is approximately 2 feet thick beneath the tar pit. The total estimated volume of tar is 5000 yd^3.

Tar and soil contaminated with tar are widely distributed over the site as a result of coal gasification plant operations. Figure 2 shows the principal areas of waste discharge. These areas include:

- The plant property - possible spills and waste
- Areas receiving overland flow
- Areas where wastes and wastewaters were ponded
- Areas receiving runoff from ponds.

Surface areas of tar contamination are confined to the three areas listed above. The vertical extent of a relatively "pure" tar is estimated to be on the order of several feet. However, during the soil investigation, evidence of tar contamination was observed at greater depths. The vertical migration of tar appears to have been affected by gravitational pull as black oily layers were observed just above silty layers. The deepest penetration of tar was observed at a location adjacent to the ponds where a slight tar odor was detected at a depth of 50 feet. Figure 3 shows cross sections of the site with the location of this soil boring (18). The location of the cross sections can be found on Figure 1.

The presence of tar at depth is in part a function of the underlying stratigraphy. In locations where less permeable confining zones (aquitards) are present, evidence of tar at depth is not found. At the borehole 18 location, this upper aquitard appears to be very thin or absent. A lower aquitard between the sand aquifer and the lower aquifer also appears absent at this location.

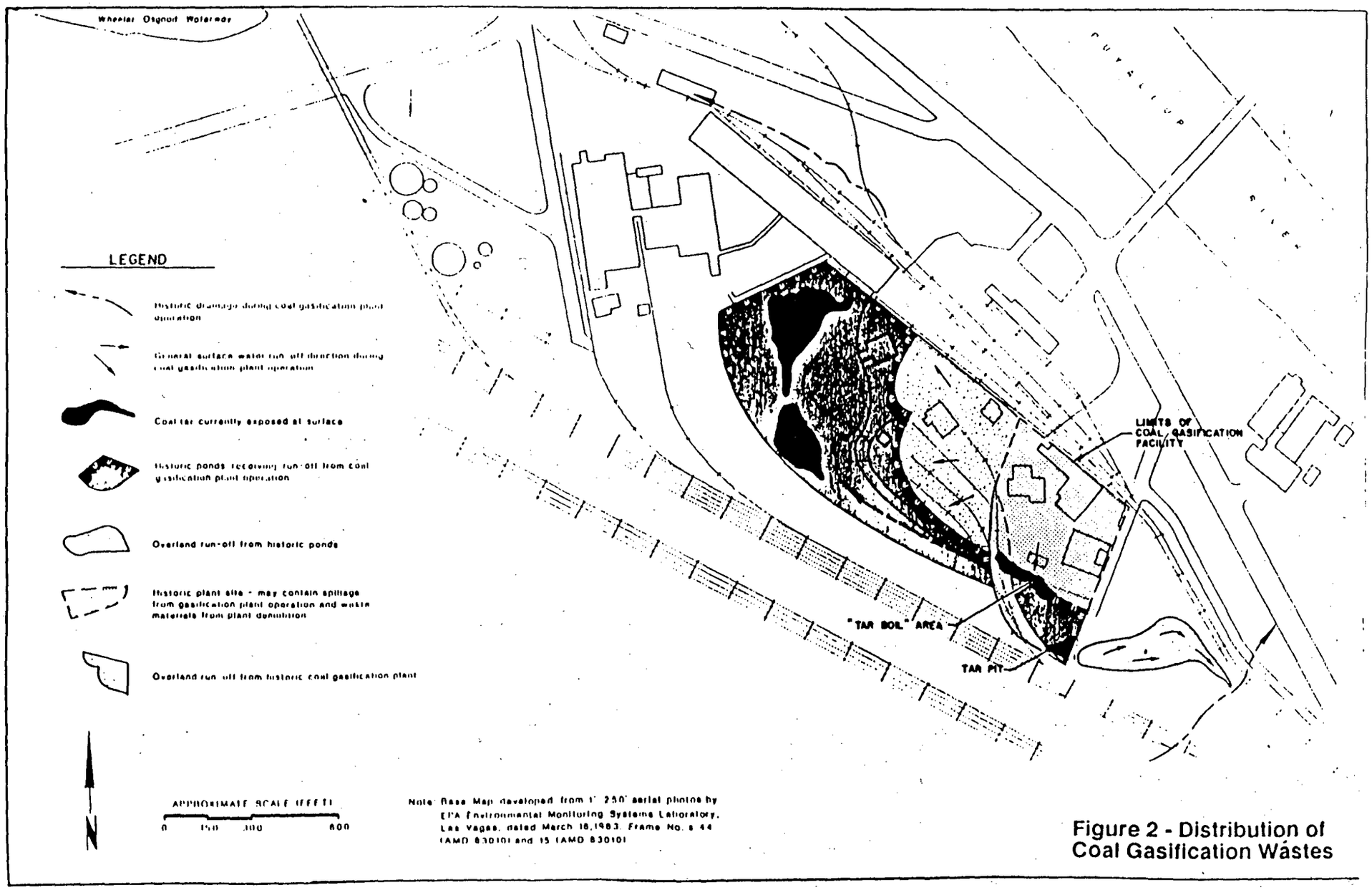


Figure 2 - Distribution of Coal Gasification Wastes

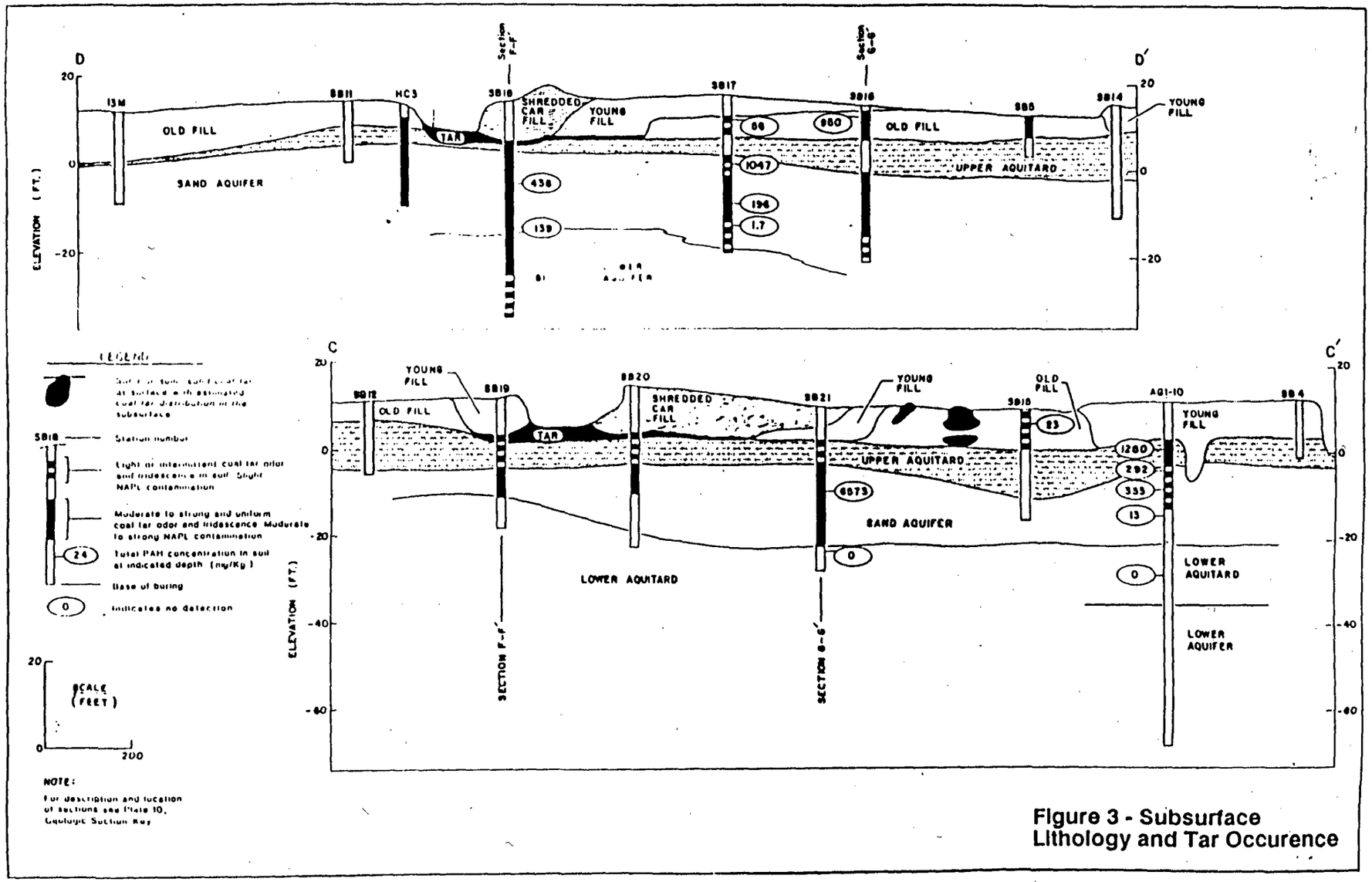


Figure 3 - Subsurface Lithology and Tar Occurence

PCBs

PCBs are widely distributed in the fill material across the site, with concentrations in surface soil ranging from the method detection limit to 204 mg/kg. PCBs appear to be confined to the fill material overlying the upper aquitard. Figure 4 shows the areal extent of PCB contamination as defined by the RI.

Metals

Metals concentrations are generally elevated in the fill material with significantly lower concentrations at depths of 8 to 10 feet, coinciding with the top of the upper aquitard. Highest concentrations are present in areas where shredded car interiors are stockpiled. Lead was the most widely distributed heavy metal, with concentrations highest in the northern portion of the site (greater than 10,000 mg/kg). Tars generally contained less than 200 mg/kg of lead, while most surface soils contained concentrations of 2000 to 8000 mg/kg. Figure 5 shows the extent of lead contamination in surface soil.

3. Surface Water

Surface runoff patterns at the site are complicated by the variety of surface materials (i.e., asphalt, car interiors, scrap metal) and the lack of topographic relief. Surface waters in the eastern portion of the site flow primarily to the BNRR ditch on the south side of the property, and then are diverted northeast towards the Puyallup River. Surface water in the western portion of the site flows westward toward the North and South ponds.

Monitoring of surface water flow was performed at 15 surface water monitoring stations. Surface water quality was determined on several occasions at five of these stations. Heavy metals, cyanide, and organic contaminants were detected in surface waters on-site.

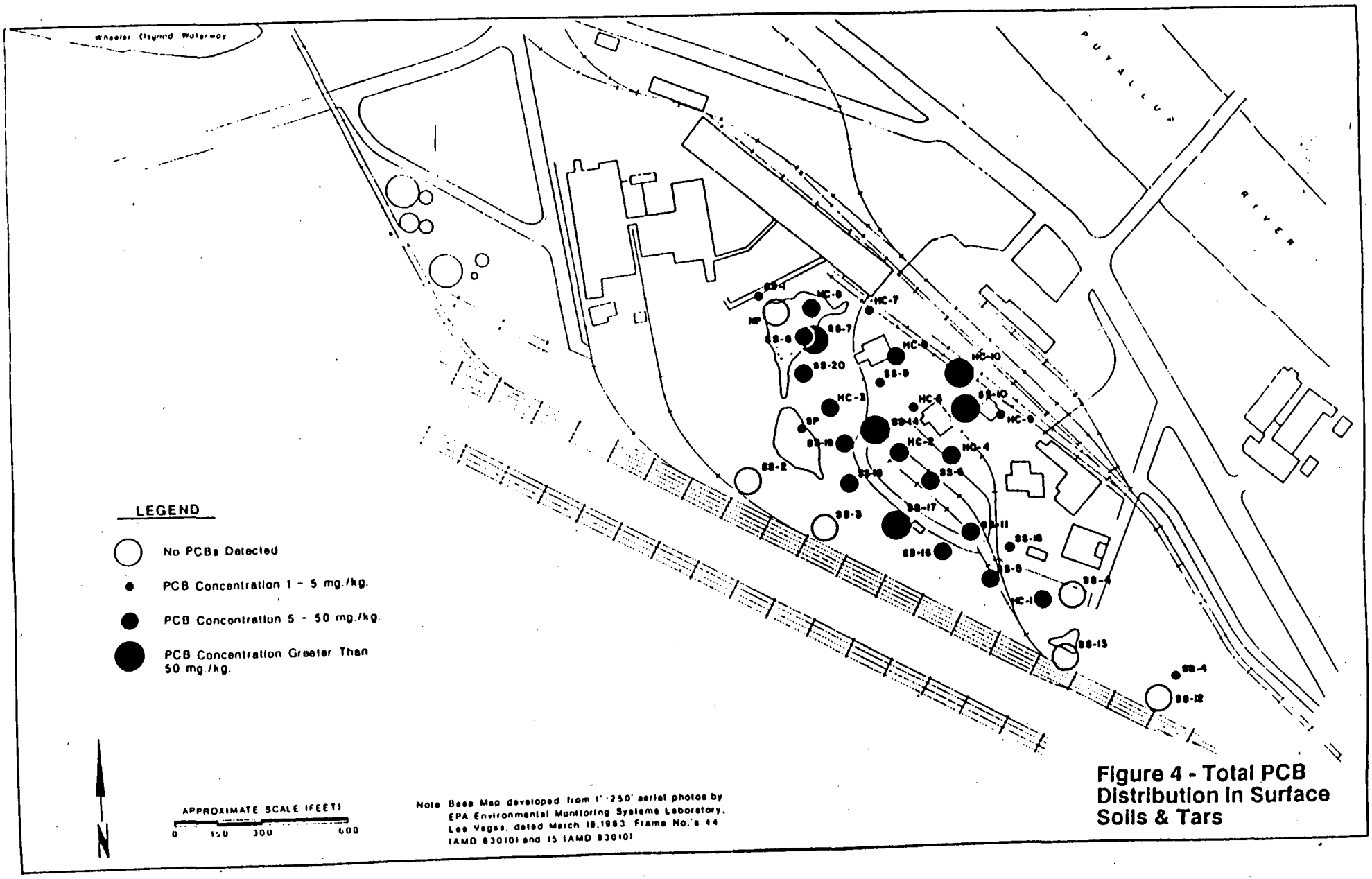


Figure 4 - Total PCB Distribution In Surface Soils & Tars

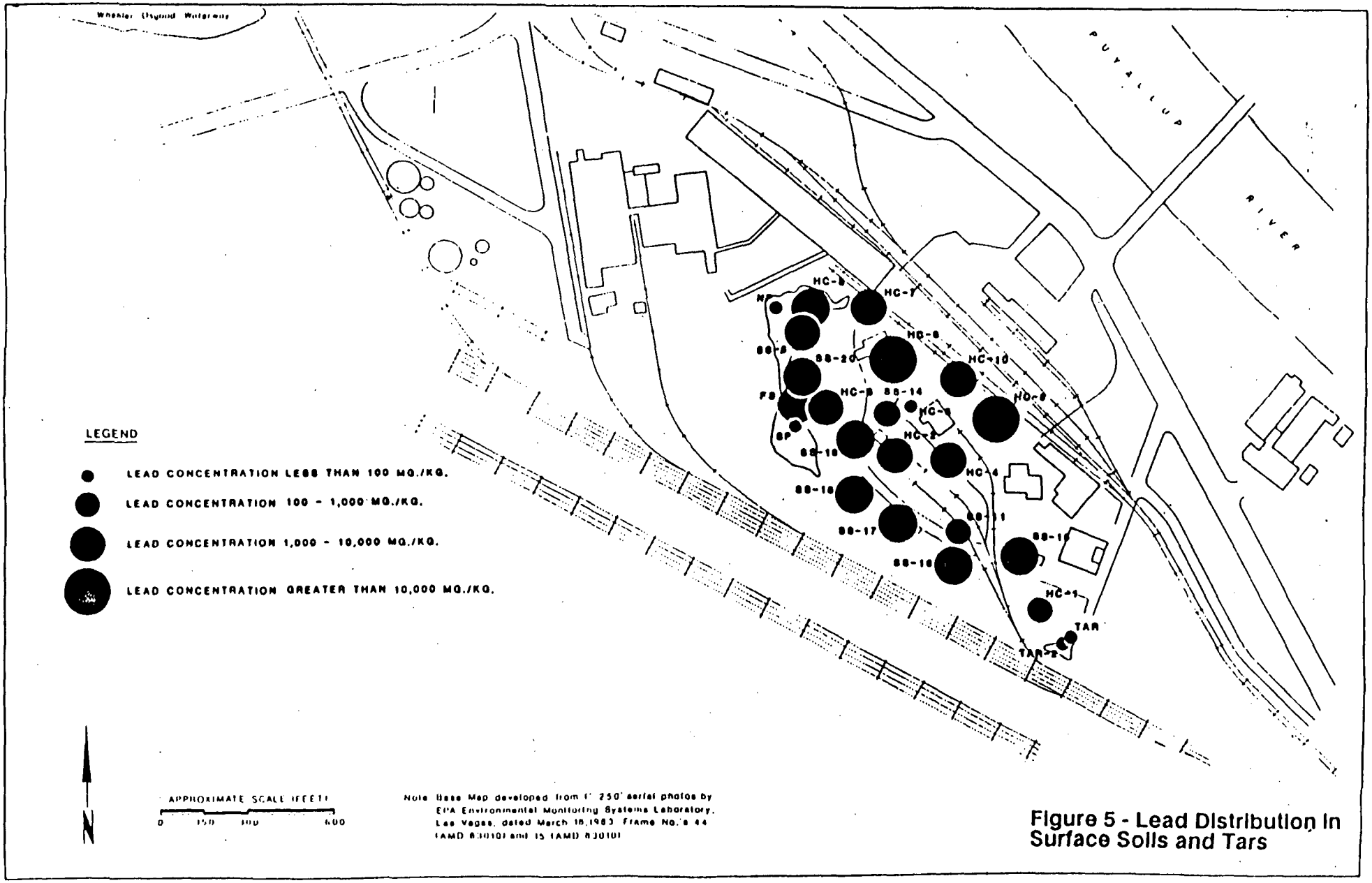


Figure 5 - Lead Distribution in Surface Soils and Tars

Surface water quality is characterized by near-neutral pH (6.5 to 7.2) with conductivities ranging from 270 to 525 umhos/cm. Trace concentrations of barium, iron, manganese, and zinc were detected in most surface water samples. Aluminum, arsenic, cadmium, chromium, copper, lead, mercury, and nickel were intermittently detected in low concentrations. Cyanide was detected at one sampling station.

Analytical data indicates a variety of organic compounds are present in surface waters. These compounds include aromatics compounds (benzene, toluene, xylene), PAHs (naphthalene, pyrene, acenapthene), nitrophenols, and PCBs.

4. Groundwater

The local groundwater system was investigated by construction of soil borings, installation of 23 groundwater monitoring wells, the sampling of these 23 wells, and sampling of 6 wells installed during a prior investigation. Information on subsurface conditions obtained by the soil investigation program was also used to define local geologic conditions. The results of the groundwater investigation showed that three shallow water-bearing strata (aquifers) exist at depths of less than 60 feet. In order of increasing depth, these aquifers are referred to as the fill, sand, and lower aquifers respectively. In some locations these three "aquifers" are separated by finer clay minerals. In these locations, flow between these aquifers would be reduced. However, in some locations this "confining" layer is absent and waters from one aquifer are in direct contact with waters from a deeper aquifer (see Figure 3), allowing waters from these two aquifers to mix.

The presence of groundwater monitoring devices in three subsurface zones allowed estimations of directions of groundwater flow. Results indicate that in the shallowest zones (fill and sand aquifers) tides strongly affect the direction of groundwater flow and, therefore, water movement. However, the system is extremely complex, and therefore, only estimates of the quantity and rates of water movement are possible. As there are only a limited number of groundwater wells investigated in the deepest aquifer, the direction of groundwater flow cannot be accurately estimated.

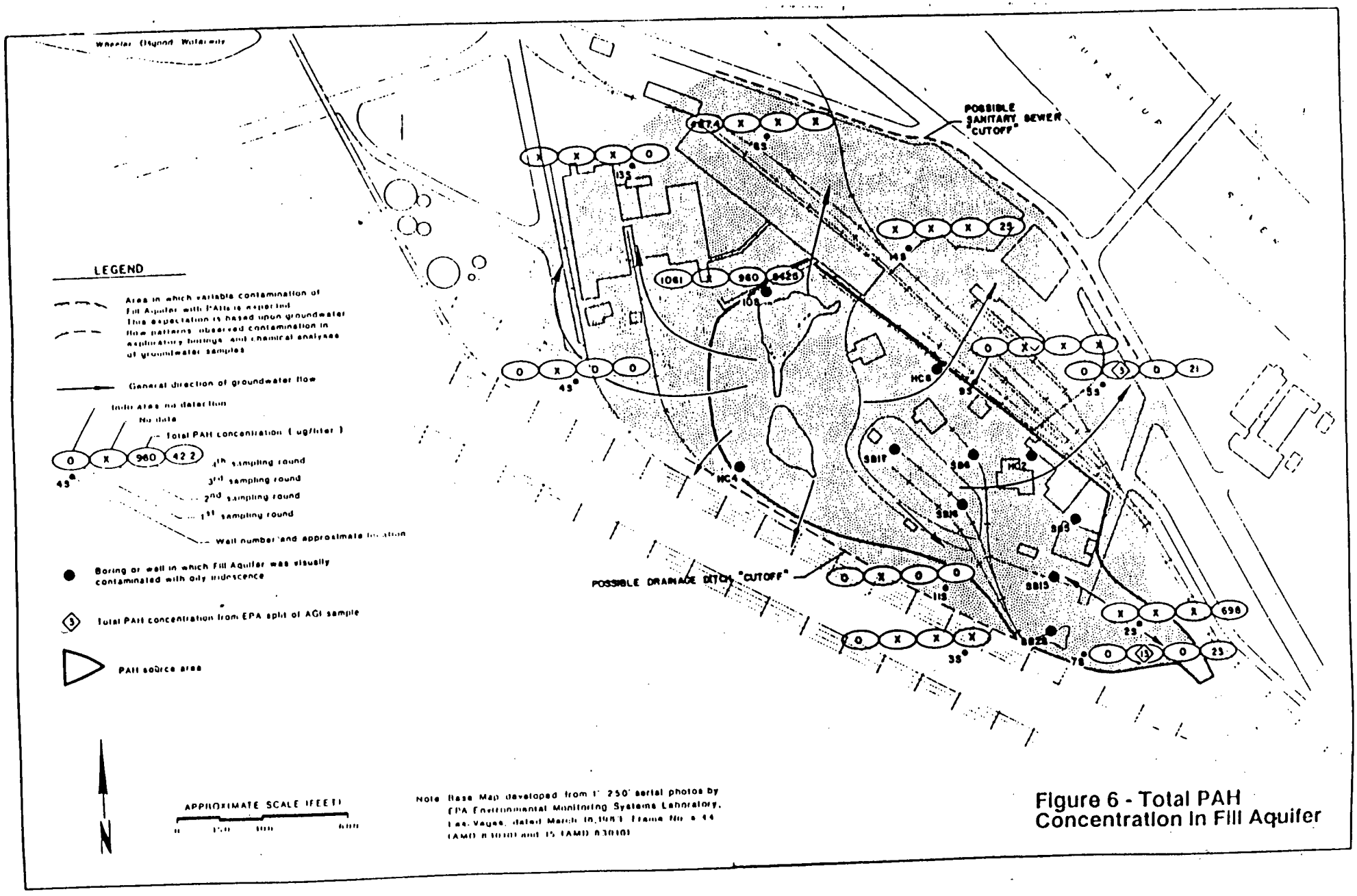
Fill Aquifer Water Quality

Water quality in this aquifer is characterized by near-neutral pH (6.1 to 7.2) with conductivity ranging from 300 to 860 umhos/cm. These conductivities suggest levels of total dissolved solids of about 500 mg/l. Trace concentrations of aluminum, barium, iron, manganese, and zinc were detected in most fill aquifer samples. Mercury, arsenic, and lead were detected in groundwaters from some wells.

A variety of organic compounds were detected in groundwaters of the fill aquifers. These include benzenes, phenols, and PAHs. For most wells, total PAH and benzene concentrations range from 5 to 30 ug/l, although samples from some wells indicate waters containing significantly higher concentrations. Figure 6 shows the areal distribution of total PAH compounds in the fill aquifer for four rounds of groundwater sampling.

Sand Aquifer Water Quality

Groundwater in the sand aquifer is characterized by pH values ranging from 6.0 to 7.0, with conductivities (720 to 7250 umhos/cm) higher than the overlying fill aquifer. Concentrations of trace metals in this aquifer are similar to those observed in the fill aquifer. Cyanide was detected in the one well, and organic compounds were detected in 9 of 14 wells sampled.



Note: Base Map developed from 1" = 250' aerial photos by EPA Environmental Monitoring Systems Laboratory, Las Vegas, dated March 10, 1983. Frame No.s 44 (AMD 830101) and 45 (AMD 830101).

Figure 6 - Total PAH Concentration in Fill Aquifer

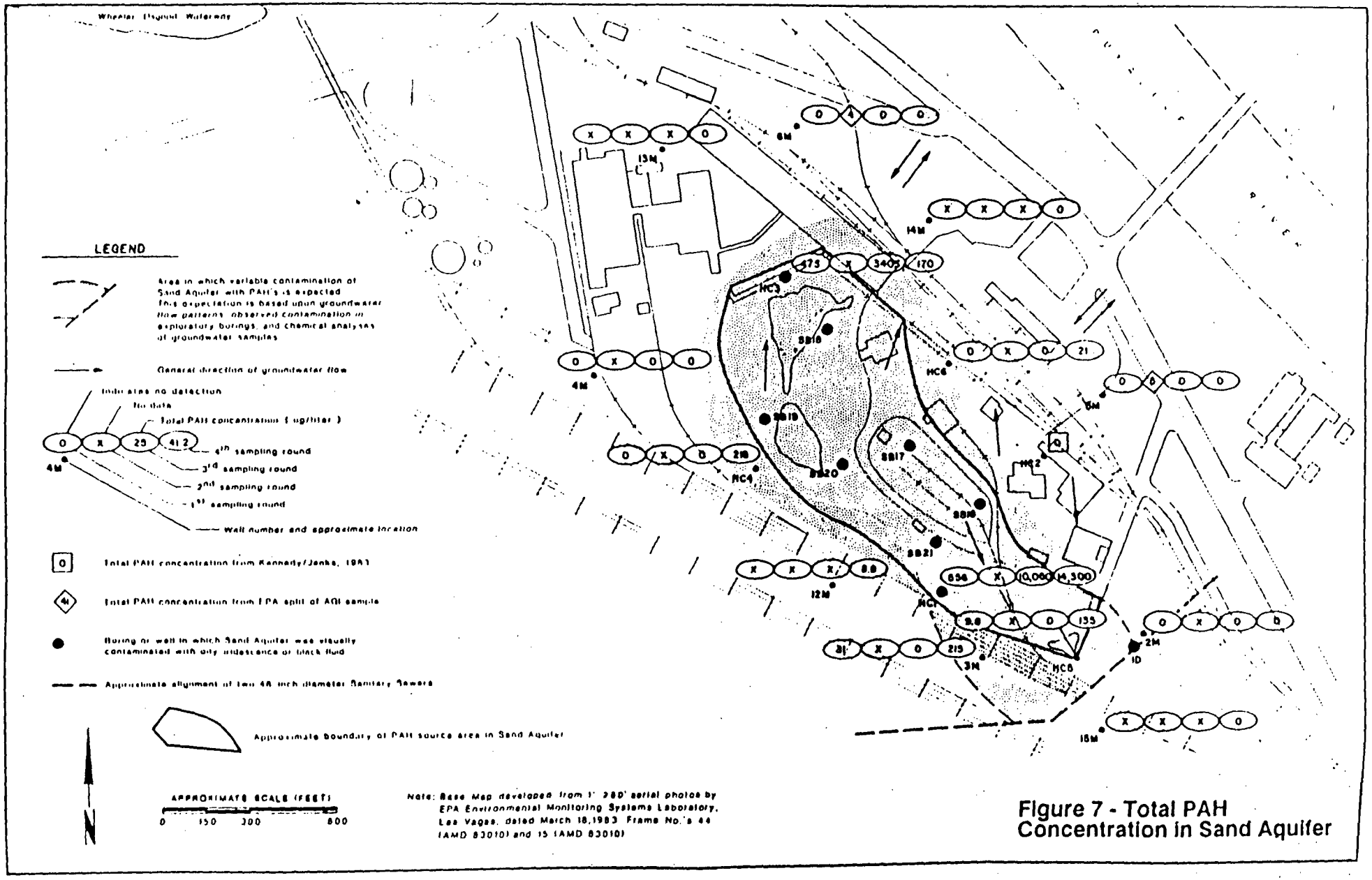


Figure 7 - Total PAH Concentration in Sand Aquifer

Organic compounds detected include benzenes, phenols, and PAHs, similar to the fill aquifer. Although very high PAH concentrations were detected in wells within the site boundary (up to 14,000 ug/l), concentrations decrease with distance from the site. Figure 7 shows the distribution of PAH compounds in the sand aquifer.

Lower Aquifer Water Quality

Three groundwater monitoring wells are placed in the third aquifer at the site. Although these zones may not be continuous and the direction of groundwater flow in this zone is poorly defined, the wells are placed such that there is a reasonable degree of certianty that "worst-case" downgradient water quality is being measured. Water quality results suggest that water in this zone does not contain significant concentrations of contaminants.

5. Migration Pathways

Coal gasification wastes were placed into or onto soils. Contaminants resulting from other site operations were also introduced directly to the soil. Therefore, exposure to contamination by humans or the environment will occur via a migration pathway relating to the on-site soil contamination. Contaminants in soil may be transported directly to a receptor by ingestion, direct exposure, or inhalation of soil particles suspended in air. Contaminants volatilized from soils may also be inhaled by on-site workers or others. Soil contaminants may be solubilized and transported via surface waters or groundwaters. Human receptors may be exposed to contaminants by direct contact with waters or ingestion. Biota may be exposed to site contaminants by vegetation uptake, ingestion of aquatic organisms, ingestion of soil, ingestion of contaminated surface waters, or direct contact. The pathways considered to be of priority are transport from soil to air, surface water, and groundwater.

6. Contaminant Migration

Air

Contaminants of concern at the site could potentially be transported from the site by wind. Therefore, the RI considered the potential for movement of small particles by this mechanism. There are two methods to estimate wind dispersion. The concentrations in the air can be measured directly or the quantity of particulates can be estimated using established mathematical methods. The RI team utilized the latter of these approaches. Results suggest that PCBs and lead are the pollutants of greatest concern. Results also indicate that on-site workers would be the only humans at risk from exposure to these contaminants. The site poses no risk to the surrounding community by wind blown dispersion of contaminants.

Surface Water

Surface-water flow rates and contaminant concentrations were used to calculate fluxes of contaminants leaving the site via the surface-water pathway. A single surface-water monitoring station was selected and fluxes calculated for compounds that had been detected at that location. Fluxes are available for selected metals, benzenes, and PAHs.

Ground Water

The estimation of rates of transport for contaminants via the groundwater system is limited by the current lack of understanding of local groundwater hydrology. Due to the complicated nature of the system, values have a low degree of confidence and should be used with caution. Fluxes for metals, benzene, phenols, and PAHs were calculated for fill and sand aquifers. Contaminant fluxes are generally low.

D. The Risk Assessment

The purpose of the risk assessment was to determine the magnitude and probability of potential harm to humans and the environment and to determine site performance standards (cleanup levels). The RA evaluations were based on the results of the RI and methodology currently in use by the EPA. These methods establish guidance for the estimation of levels to which hazardous waste sites should be remediated.

The RA evaluations consisted of four study elements: exposure, toxicity, risk characterization, and selection of "How Clean is Clean" levels or site performance standards. The methodology used in the RA under the above study elements includes the identification of exposed populations and exposure pathways, the selection of indicator contaminants for carcinogens and threshold-acting chemical constituents, computation of acceptable doses for these target chemicals, and the quantification of risks.

The major contaminants at the site are coal tar pitch residuals, PCBs, and trace metals. From data generated by the RI, three organic constituents and one trace metal were selected as indicator chemicals representing the overall level of site contamination. These indicator contaminants were selected based on their toxicity, concentrations in site waters and soils, and tendency to be transported from the site. The selected indicator compounds are benzo(a)pyrene, PCBs, benzene, and lead. The RA evaluations were performed for these indicator chemicals and the exposure pathways appropriate to the target population. Soil ingestion, inhalation of airborne particulates and vapors, and dermal contact were all considered pathways for exposure.

The target receptor (exposed population) considered for the RA were the on-site workers. Since the site is within a heavily industrialized area, wildlife or fish populations were not considered as target receptors except

for the avian population which occasionally uses the pond areas on the site.

The "How Clean is Clean" levels defined as maximum allowable concentrations (MASC) for on-site soils were determined from simple models which quantify the transport of contaminants from the source (on-site soils) to the receptor (on-site workers). In addition to transport factors, the models account for the contaminant intake rate which will not induce an adverse affect to target receptors. This latter parameter, defined as the Acceptable Dose (AD), was estimated from EPA-approved hazard assessment data for carcinogens and threshold acting chemicals.

MASCs were calculated from these predictive models and the uncertainty associated with these values was quantified using probabilistic sampling techniques. The MASC values for the target contaminants were then reported as the concentration of the contaminant in soil associated with a specific probability of exceeding the acceptable level for that constituent.

For lead, the MASC was computed for two AD values corresponding to the promulgated maximum contaminant level (MCL) and the recommended maximum contaminant level (RMCL). The ADs for lead were derived from drinking water standards. For the carcinogens (benzene, benzopyrene, PCB), the MASCs were reported for two risk levels, 10^{-4} and 10^{-6}, and for two exposure periods (lifetime and short term). The lifetime exposure period assumes that a site worker would be in contact with site soils for a 70-year period. The short-term exposure period assumes continuous contact with deeper soils or tars for a 1-month period during construction or excavation activities.

The MASC values computed for the individual and cumulative pathways are summarized in tabular form in Table 1. Included in the table are the comparable MASC values associated with a 10 percent probability of exceeding

Table 1. Pathway Specific MASC Values

Chemical	Exposure Period	Risk Level	Ingestion MASC (mg/kg)	Dermal MASC (mg/kg)	Inhalation MASC (mg/kg)	Cumulative MASC (mg/kg)
Lead	Daily	0; AD from MCL	91	98	2,500	57
Lead	Daily	0; AD from RMCL	226	242	6,250	139
BAP	Lifetime	10^{-4}	16	2.4	2,673	2.2
		10^{-6}	0.2	0.02	26.7	0.02
	Short Term	10^{-4}	1132	93	158,800	87
		10^{-6}	11.3	0.93	1,588	0.9
PCB	Lifetime	10^{-4}	3.6	0.7	947	0.6
		10^{-6}	0.04	0.01	9.5	0.01
	Short Term	10^{-4}	3,013	588	782,353	524
		10^{-6}	30.1	5.9	7,824	5.2
Benzene	Short Term	10^{-4}	444,000	1,637,000	5,654	5,613
		10^{-6}	4,440	16,370	56.5	56

the acceptable dose for each target chemical and each pathway, and the cumulative exposure rates. This risk level has been selected as a recommended level of protection. As shown, dermal contact is the critical exposure route for the organic contaminants. Inhalation is not a significant pathway at the maximum total suspended particulate matter concentrations predicted for the site.

The RA presented these values with recommended cleanup goals. In a series of meetings between the EPA and Ecology, it was agreed that remedial objectives associated with both the 10^{-6} and 10^{-4} risk levels would be evaluated during the FS. The mutually agreed upon cleanup standards are summarized in Table 2.

Table 2. Cleanup Goal Performance Standards
Maximum Allowable Contaminant Concentrations
Tacoma Tar Pits Site

Contaminant or Contaminant Class	Soils (mg/kg)	Surface Water, Boundary (ug/l)	Surface Water On-Site (ug/l)	Groundwater (sand and fill aquifers) (ug/l)
Lead	166(2)	3.2(4)	172(7)	50(8)
Benzene	56(3)	53(5)	5,300(7)	53(5)
PCBs	1.0(3)	0.2(4)	2(7)	0.2(4)
PAHs(1)	1.0(3)	5 - 30(6)	219(7)	5 - 30(6)

(1) Included are benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-c,d)pyrene.

(2) Acceptable dose.

(3) 10^{-6} Risk Level.

(4) Chronic freshwater ambient water quality criterion. Performance based on detection limit.

(5) Acute freshwater ambient water quality criterion x 1/100.

(6) Estimated range of chronic freshwater ambient water quality criterion based on marine criteria.

(7) Estimated acute freshwater ambient water quality criterion.

(8) Drinking Water MCL.

IV ENFORCEMENT

A RI and FS was conducted by Joseph Simon & Sons, Inc., Washington Natural Gas Company, Hygrade Food Corporation, and Burlington Northern Railroad Company pursuant to an "administrative order on consent" entered into and issued by EPA on November 1, 1984. EPA is now prepared to implement the settlement procedures set forth in Section 122 of CERCLA, 42 U.S.C. §9622, and offer these same parties the opportunity to perform the selected remedial action pursuant to a consent decree. EPA intends to commence a negotiation period with the PRPs shortly after the signing of the ROD. The Department of Interior and the State of Washington have been invited to participate in the negotiations. If for any reason, agreement cannot be reached with these parties, EPA will initiate alternative action to insure that the remedial action proceeds. Finally, EPA is still considering the possibility of identifying additional parties who may be potentially responsible for conditions at the site.

V COMMUNITY RELATIONS

Community interest for the Tacoma Tar Pits Superfund site has not been actively demonstrated to either EPA or Ecology. It must be considered that this site is actually a small unit within the larger Superfund site, Commencement Bay - Nearshore/Tideflats and that the Tacoma Tar Pits is located within a heavy industrialized area with no private residences nearby. In fact, the community relations plan for the Tacoma Tar Pits is contained within the plan for Commencement Bay and South Tacoma Channel Superfund sites. Under a cooperative agreement with EPA in 1983, Ecology was delegated as the lead agency in conducting investigations for the Nearshore/Tideflats, Ruston/Vashon Island, and Tacoma Municipal landfill sites. EPA retained its role as the lead agency for the Tacoma Tar Pits, ASARCO Tacoma Smelter, South Tacoma Swamp, and Well 12A sites. The Tacoma-Pierce County Health Department, (Health Department) through another Interagency Agreement with Ecology, conducts community relations support activities for the Nearshore/Tideflats and Ruston/Vashon Island sites.

The Commencement Bay and South Tacoma Channel Superfund sites are located within the City of Tacoma, on the south central portion of Puget Sound, Pierce County, Washington. Tacoma is one of the oldest cities in the Pacific Northwest, dating back to 1841. The population of Tacoma, the second largest city in Washington nest to Seattle, is 158,501 (U.S. Department of Commerce, 1980), and 485,667 people live in Pierce County.

Manufacturing, wholesale and retail trade, and services are the primary industries in the Tacoma area (Washington State Employment Security, 1985), with a large portion of the labor force employed in the manufacturing sector. Surrounding areas are characterized with densely populated forests which supply the lumber necessary to local industry. Manufactured goods are primarily wood and paper products, and chemicals. The Port of Tacoma is the state's largest export port, and auto import port. It is the fourth largest auto importer on the West Coast. During the years 1980 to 1986 the county's population has grown 9.3 percent, and non-agricultural employment increased by 15.2 percent (Washington State Employment Security, 1987). Clearly, Tacoma's economy has been growing steadily in recent years.

Both present and historical industrial activities have released hazardous chemicals and other production by-products into Commencement Bay, the South Tacoma area aquifers, and the surrounding environment. These products include metals (arsenic, lead, zinc, copper, cadmium, hydrocarbons (PAHs), chlorinated butadienes, and pesticides. Hazardous substances have been found in sediments in the waterways, cadmium and arsenic have been documented is soils near the Ruston area, PAHs and PCBs have contaminated groundwater aquifers in the South Tacoma area, and fish and shellfish in Commencement Bay have been found with elevated levels of organics and other clorinated compounds in their tissues.

Chemical contamination of Commencement Bay and the South Tacoma Channel area prompted the site's nomination to the National Priorities List (NPL) in October, 1981. In April, 1983 the EPA announced an agreement with Ecology to conduct a RI/FS for the Commencement Bay Superfund site. The RI, which was completed in 1985, characterized the nature and extent of contamination in the

Nearshore/Tideflats area. The FS, which evaluates and alternatives of cleanup action for this area of the Tacoma Superfund Sites is now underway. RIs for the Tacoma Municipal landfill, South Tacoma Swamp, Tacoma Tar Pits, and South Tacoma Channel, and FSs for the South Tacoma and Tacoma Tar Pits have been completed. An on-site RI for the ASARCO Tacoma Smelter began in September, 1987. These investigations are being conducted by private consulting firms.

Community Involvement

Tacoma area residents became acutely involved in Commencement Bay and South Tacoma Channel environmental issues prior to their nomination to the NPL in October 1981. Over one hundred people attended an April 1981 public meeting at which several federal, state, and local governmental agencies met to explain the area's contamination and hazardous waste problems, and describe what would be done about the situation. Concern about these problems was moderate, with groups such as the Audubon Society and Washington Environmental Council the most active. Most people's comments at that time centered around the perception that not enough was being done to correct the problems. at that time, Commencement Bay and the South Tacoma Channel were given considerable press and media attention.

In the years following Commencement Bay and South Tacoma Channel's nomination to the NPL, the level of citizen concern appears to be less than it was in 1981. EPA, Ecology, and other agencies have conducted several investigations, sampling-analysis surveys, and cleanup activities at many of

the individual areas within the Commencement Bay and South Tacoma Superfund sites. These investigations have served as demonstrations that Tacoma's hazardous waste problems are not being ignored, and have provided a better understanding of the nature of the problem and its risk to human health and the environment.

The Health Department by Interagency Agreement with Ecology has been the lead agency for implementing a Superfund Community Relations Plan was completed for the Commencement Bay site. In response to input at a public meeting held in 1983, the Health Department developed a Citizen Advisory Committee (CAC) to help implement the Community Relations Program during investigations and remedial action at these Superfund sites.

Community Relations activities conducted by the Health Department have included: Coordinating and holding public meetings for informational purposes and at various stages of the specific site investigations and cleanup, briefing local governmental officials on the status of area Superfund investigations, hazardous waste presentations to grade school children, presentations to environmental groups and interested parties upon request, and tours of Commencement Bay. Additional activities have included the production and distribution of pamphlets and fliers (including translation for Asian communities) to Tacoma and Pierce County communities, and preparing project updates, fact sheets, and press releases.

Specific Activities: Tacoma Tar Pits

On three separate occasions over the past two years EPA has met with the CAC to update the group as to the progress with the investigations and to indicate EPA's future plans. The CAC as well as a larger group of interested citizens and special interest groups have been recipients of news letters and project updates. The most recent mailing was issued the first week in November 1987. Approximately 200 copies of the Proposed Plan and Project update (Fact Sheet) for Tacoma Tar Pits were sent out using the Commencement Bay mailing list. On November 18, 1987, EPA held a public meeting at the Pierce County Health Department to accept comments on the preferred alternative for remedial cleanup at the Tacoma Tar Pits site. Despite wide coverage by newspaper, radio, and a local television station, only two private citizens came forward to comment on the proposed plan. These comments are addressed in the Responsiveness Summary. Copies of the Administrative Record have been maintained at the Tacoma Public Library. Although no comments other than those from the Potentially Responsible Parties (PRP) were sent by the close of the public comment period, EPA shall continue to make the effort to keep the public informed and provide an opportunity for participation. This aspect of the community relations effort addresses the overriding concern expressed by citizens that information must be both accurate and timely as opposed to the information they formerly received solely through the media. The other major concern expressed is that they do not see the agencies taking corrective action on so called priority sites. The high level of community relations activities and proceeding forward with the ROD leading to remedial action are the best measures to deal with these concerns.

The purpose of the FS was to develop and evaluate possible alternatives to perform site cleanup. Available technologies were screened for applicability and assembled into alternatives ranging from no action to permanent treatment of all contaminants. A total of 19 preliminary alternatives were developed, nine of which included options for groundwater extraction and treatment. Technologies considered in these alternatives included dust control, capping, stabilization, excavation with off-site landfilling, electric pyrolysis, incineration, and in situ vitrification for the soils. Groundwater extraction with wells or subsurface drain pipes was included, as was pumping of pond water. Water treatment options included activated carbon adsorption and filtration or stabilization. Ten of the preliminary alternatives, including no action, were retained after initial screening for health protection and cost.

Site conditions were evaluated and clean-up levels established based on lifetime cancer risk levels of one per ten thousand (10^{-4}) and one per 1 million (10^{-6}). Alternatives containing soil excavation were evaluated for both of these risk levels.

Table 3 contains a brief description of the 10 candidate alternatives. These alternatives were subjected to detailed analysis. According to regulatory guidelines, the detailed analysis of each alternative included:

- Refinement of the alternative with emphasis given to defining established methods of handling or treating wastes.
- Evaluation in terms of engineering implementation, reliability, anticipated performance and safety.
- An assessment of the extent to which the alternative is expected to effectively prevent or reduce the threat to public health and welfare and the environment.

- An analysis of any adverse environmental impacts and methods for reducing or eliminating these impacts.
- Detailed cost estimation, including costs associated with long-term operation and maintenance associated with the alternative.
- The degree to which each alternative conforms to federal and state requirements and regulations.
- Concerns of the community.

Table 3. Summary of Remediation Alternatives

Alternative

1 No soil or water remediation is performed. Continued groundwater monitoring. Every five years, the site is reinvestigated to determine the disposition of contamination. No other actions are conducted.

4 Source control of contaminated pond water. On-site land use restrictions are imposed to prevent future exposures to soil. Potential exposures to contaminated groundwater are controlled by water use restrictions.

5 Source control by treating contaminated surface water, management of migration of soil contamination by capping with a soil base and an asphalt surface, monitoring of groundwater, land-use restrictions and water-use restrictions on the site.

6 Treatment of pond water. Use of an impermeable cap to manage contaminant migration, and institutional controls including land-use and water-use restrictions.

9 Stabilization of surface soils exceeding one per 10,000 cancer risk to create an impermeable surface, treatment of the pond water by its use in the stabilization process, control of surface water infiltration by constructing drainage ditches, land and water use restrictions, and site monitoring.

9b Groundwater extraction and treatment used in conjunction with alternative 9.

13 Similar to Alternative 9, except that surface soils with contamination exceeding the one per one million cancer risk levels for PCBs, PAHs, and benzene are stabilized.

13b Groundwater extraction and treatment used in conjunction with alternative 13.

15 Permanent treatment of the contaminated surface soils by incineration and stabilization. Pond water is treated by its incorporation into the stabilization process. Clean backfill material is placed on the unpaved areas. Incineration residues are stabilized with the lead-contaminated wastes. The stabilized material is placed to form an impermeable cap. Groundwater monitoring and land and water use restrictions.

15b Groundwater extraction and treatment used in conjunction with alternative 15.

16 Surface-water treatment; excavation of surface and subsurface soils contaminated above the one per 10,000 risk level for PAHs; dewatering of soils as necessary for excavation and treatment of the water, backfilling and compaction; grading of the site and construction of a drainage ditch to prevent surface-water ponding; repaving of areas necessary for metal recycling operations; land and water use restrictions.

16b Groundwater extraction and treatment used in conjunction with alternative 16.

18 Surface water in ponds is treated with water obtained from dewatering of soils. All contaminated soils above the one per 1 million risk level are removed and landfilled off-site. Clean soil is backfilled into the excavation pit. The soil is then compacted and graded so that surface water flows to a drainage ditch and does not pond. Ground water is monitored and temporary water use restrictions are imposed.

18b Groundwater extraction and treatment used in conjunction with alternative 18.

19 Organic contaminants in soils above the one per 1million risk level are destroyed by incineration. Soils containing lead and other heavy metals are stabilized; contaminated surface water is used in the soil stabilization process. The slurry is spread over the site and allowed to solidify into an impermeable surface. Ground water is extracted and treated until analyses indicate that the groundwater meets the cleanup levels.

The ten candidate remedial alternatives were rated according to the concerns listed above as grouped into the following five criteria:

- Technical feasibility
- Institutional requirements
- Public health impacts
- Environmental impacts, and
- Cost analysis

Table 4 contains factors which contribute to each of these five criteria.

Table 4. Detailed Evaluation Criteria

TECHNICAL FEASIBILITY

Performance
- Effectiveness
- Useful life

Reliability
- Operation and maintenance requirements
- Possible failure modes

Implementability
- Constructability
- Time

Safety
- Worker
- Neighborhood

INSTITUTIONAL REQUIREMENTS

Conformance to Applicable or Relevant and Appropriate Requirements (ARARs)
Community Concerns

ENVIRONMENTAL IMPACTS

Beneficial effects
- Final environmental conditions
- Improvements in biological community
- Improvements in resources

Adverse effects
- Construction and operation
- Mitigative measures

PUBLIC HEALTH IMPACTS

Minimization of chemical releases
Exposures during remedial action
Exposures after remedial action

COST

Capital cost
Operation and maintenance costs
Present worth

Each of the candidate alternatives was rated for the above factors according to a high/moderate/low scheme. A high rating indicated that the alternative meets or exceeds objectives for cleanup. A moderate rating indicates the alternative only partially addresses the clean-up objectives, while a low rating indicates that clean-up objectives are not met for this criteria. The ratings for each factor in general categories are then combined. These ratings for the 10 candidate alternatives are presented in Table5. As Alternatives 9, 13, 15, 16, and 18 contained options for groundwater treatment, these alternatives have two sets of ratings. The alternatives including groundwater treatment are numbered with the Symbol b (i.e. 9b).

From this evaluation a preferred remedial alternative was selected. The selection considered the degree to which site performance standards would be attained, the degree of clean up performed as required by regulations, and the degree to which routes of contaminant exposure are eliminated or controlled.

Table 5. Summary of Detailed Evaluation

No.	Technical Feasibility Rating	Institutional Considerations Rating	Environmental Impacts Rating	Public Health Impacts Rating	Cost Analysis (Present Worth, Million Dollars)
1	High	Low	Moderate	Low	0.8
4	High	Low	Moderate	Moderate	1.0
5	High	Low	Moderate	High	1.7
6	High	Moderate	Moderate	High	3.8
9	High	High	Moderate	High	3.3
9b	High	High	High	High	4.2
13	High	High	Moderate	High	3.4
13b	High	High	High	High	4.3
15	High	High	Moderate	High	8.1
15b	High	High	High	High	9.0
16	High	High	High	High	93.1
16b	High	High	High	High	93.8
18	High	High	High	High	133.1
18b	High	High	High	High	133.6
19	High	High	High	High	242.9

Note: Numbered cleanup alternatives with the Symbol b indicate ground-water extraction and treatment has been included.

VII SELECTED REMEDIAL ALTERNATIVE (No. 13)

The preferred remedial alternative (No. 13) is a combination of source control measures, measures to control contaminant release, and also measures to reduce human exposure to contaminants. This alternative consists of the excavation of the most severely contaminated soils, stabilization of these soils using a technique which immobilizes contaminants, capping of the stabilized material, treatment of surface water, continued groundwater monitoring, regulatory controls on water usage for both surface and groundwater, and restrictions on site access.

A. Description of the Selected Remedy

1. Soil Excavation

Surface soils exceeding the 10^{-6} lifetime cancer risk level, and all soils regardless of depth which are classified as Extremely Hazardous Wastes (EHW) under state law are to be excavated. Soils classified as EHW are defined as those soils exceeding 10,000 mg/kg (1 percent) PAH. Soils beneath the tar pit and ponds are known to contain PAH in excess of 1 percent. These soils will be excavated to a depth required to show PAH concentrations less than 1 percent. When the Remedial Action is undertaken, this state standard may be reevaluated for technical feasibility as allowed under §121(d)(4)(B) of SARA.

Soils and sediments from other areas will be excavated to a depth not to exceed 3 feet in all locations where soils exceed concentrations defined to have a 10^{-6} lifetime cancer risk. This 10^{-6} risk level translates to 1 mg/kg for PCB, 1 mg/kg for PAHs, and 56 mg/kg for benzene (Table 2). Surface soil contaminated with lead above the 166 mg/kg level is also excavated and stabilized. The approximate area designated for excavation is shown in Figure 8.

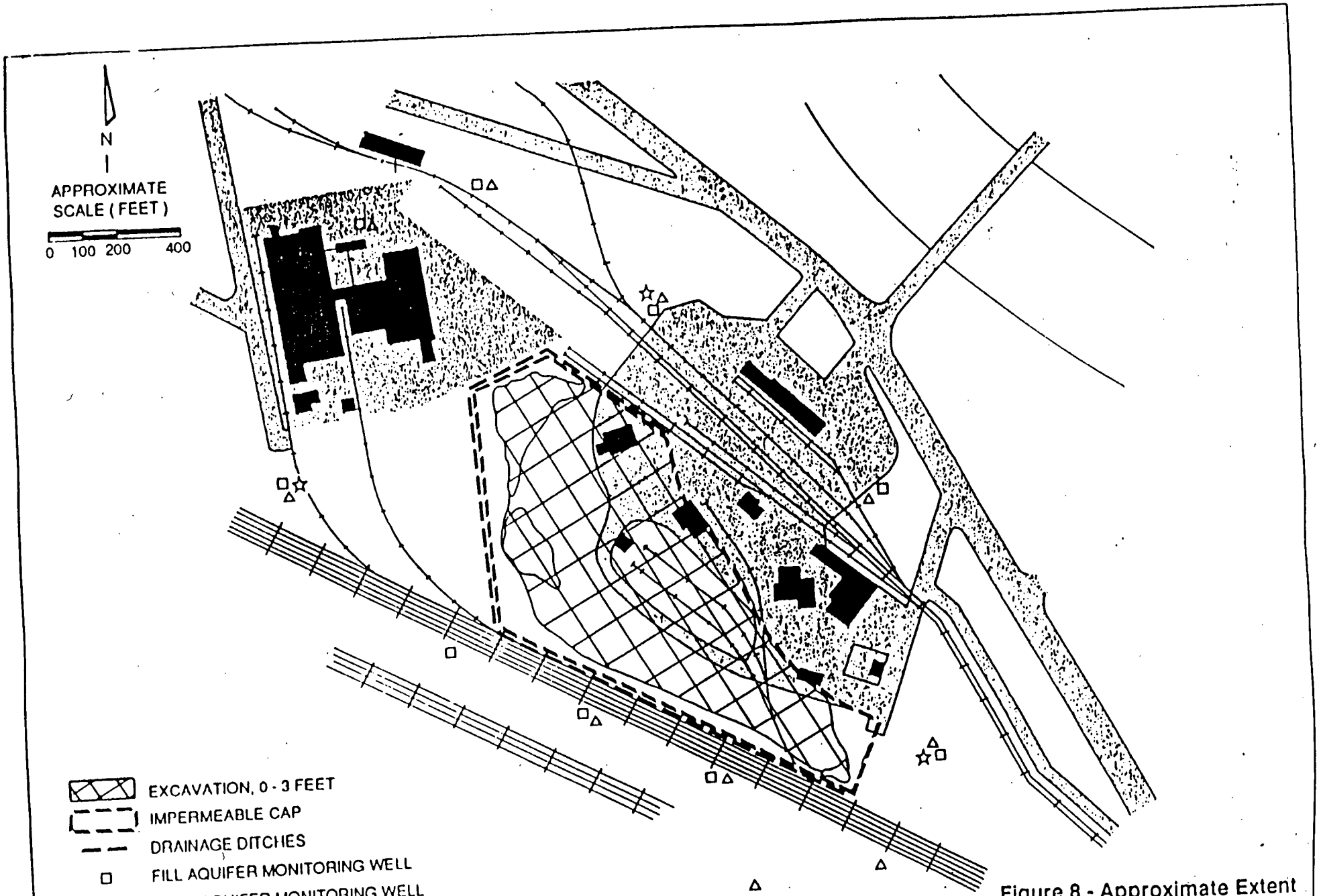


Figure 8 - Approximate Extent of Remediation

The total estimated volume of material to be excavated is 45,000 cubic yards. Backhoes, bulldozers, and front end loaders will be used to excavate soils. Dust control measures such as wetting of soils will be used during excavation to prevent wind dispersion. Sediments from the ponds are excavated later in the remedial action as waters must first be removed from the ponds. Operations at the metal recycling facility will be temporarily relocated when the area which is currently paved is remediated.

2. Soil Stabilization

To reduce the ability of contaminants to migrate from the soils prior to replacement on site, the excavated soils will be chemically treated or stabilized. Laboratory experiments will be performed to ensure that the stabilization process effectively immobilizes contaminants. Following this activity, a larger scale "pilot study" will stabilize a larger volume of contaminated material from the site. This pilot study will determine the effectiveness of the stabilization process.

As excavation proceeds, the contaminated material is moved to a hopper which screens out material larger than 6 inches in diameter and feeds the material to a grinder or crusher. The grinder pulverizes the material to produce particles smaller than 5 to 10mm in diameter. The material is then fed to a mixing vessel where silicate polymers, cement, and water from the site ponds is added. The waste will need to be thoroughly mixed prior to this step.

The proportions of polymer and cement to be added will be determined by laboratory scale studies. The final composition of the stabilized material may vary depending on the composition of soil encountered during excavation. It is estimated that 200 to 400 pounds of cement and polymer will be added per ton of contaminated soil, along with 10 to 25 gallons of water.

3. Replacement of Stabilized Soil

The chemical stabilization process should significantly reduce the toxicity and leachability of site soils. Therefore, this material will be placed back into the locations from which it was excavated. The stabilized soil will be dense and relatively impermeable to rainfall or surface water. To further reduce the flow of surface water through this stabilized material, an asphalt cap will be placed over the stabilized soil. An asphalt sealer will be used as part of this capping procedure.

Prior to placement of the stabilized mixture, the site surface will be graded to form a 3 percent slope toward the BN railroad tracks to the south. A furrow will be dug along the edge of these tracks and along the western side of the existing ponds to provide a drainage ditch. Clean fill material may be needed in the areas of the ponds to bring the surface up to grade. The mixture will then be spread over the area indicated in Figure 8. This process will proceed from the tar pit area toward the ponds. The material will be laid as a continuous layer and will be allowed to cure for up to 1 month.

The reagent composition is formulated to provide a high-strength surface capable of supporting trucks and other vehicles. In order to protect the stabilized surface from heavy equipment wear, a 2-inch layer of asphalt will be placed over it. The surface will be periodically inspected and, if necessary, repaired.

Land use restrictions will be imposed to prevent or require stringent control of future excavation on the site, to prevent future use of surface water and shallow groundwater, and to prevent site access by personnel other than site workers.

4. Groundwater Extraction and Treatment

At this time, it is not expected that groundwater extraction and treatment will be necessary. An expanded groundwater monitoring network utilizing to the extent practicable those wells shown in Figure 8 will be designed, and regular groundwater monitoring will be performed. To accomplish this, it is likely that additional wells will need to be installed. If concentrations are determined to be statistically representative of levels exceeding site performance standards, the need for groundwater extraction and treatment will be evaluated in a subsequent study.

At the current time, the groundwater system has been insufficiently characterized to completely design groundwater extraction and treatment systems for the fill, sand, and lower aquifers. Exact locations and depths of extraction wells cannot be specified nor can anticipated rates of groundwater extraction be estimated. Therefore, if groundwater extraction is deemed necessary, additional characterization of the hydrogeologic conditions of the site will be necessary as part of the system design.

5. Performance of the Selected Alternative

The proposed cleanup option was selected due to the fact that it provides a treatment alternative which reduces the mobility and toxicity of the contamination, will be protective of human health and the environment, attains ARARs, and is a cost-effective method of site cleanup. The benefits of this alternative are discussed below. First and foremost, human exposures to contaminated soils are prevented, thereby addressing the most significant health concern. Pond water is treated, and surface water infiltration is prevented by the impermeable cap. Thus, potential exposures via water sources are controlled. Permanent treatment can be provided through the

immobilization of contaminants. The cost of this alternative, estimated to be about $3.4 million, is significantly less than other alternatives which offer a comparable level of protection.

As required by Section 121 of CERCLA for Remedial Actions where wastes remain on-site, the performance of the remedial action will be reinvestigated every 5 years to ensure that the remedial action has been effective, that increasing levels of contaminants are not being released to the environment, and that human health and the environment are protected. If as a result of this frequent reassessment, the remedial action is shown to have decreased performance, the nature and extent of additional actions will be considered.

B. Statutory Determinations

The selected remedial alternative meets all statutory requirements, particularly those of CERCLA as amended by SARA. The highest priority is the protection of human health and the environment. The use of stabilization permanently treats/fixes contaminants. Therefore, the landfill closure and post-closure care requirements are satisfied with respect to control of soil contamination releases. In addition, tar sludge beneath the site with PAH concentrations in excess of 1 percent are removed and treated. PCB materials exceeding 50 ppm are permanently immobilized, consistent with the Toxic Substances Control Act (TSCA) regulations. Permanent treatment, as preferred under SARA, is used.

ARARs pertaining to surface water are satisfied because contaminants in existing surface water are removed to nondetectable levels. Future off-site discharges of surface water should meet discharge limits because the surface-water runoff does not flow into contaminated materials.

The release of additional contaminants to the groundwater is reduced by the placement of an impermeable cap, and the control of surface-water runoff. Additionally, the permanent immobilization of wastes satisfies groundwater protection regulations. Therefore, presently uncontaminated groundwater will be clearly protected, consistent with groundwater protection and nondegradation regulations. Existing contaminated groundwater within the site remains untreated; however, land use restrictions will ensure that the groundwater is not extracted or used. Action levels of contaminants in groundwater have not been consistently exceeded at off-site locations. Groundwater monitoring is conducted at the site boundaries in accordance with Resource Conservation and Recovery Act (RCRA) closure requirements to ensure that contaminated groundwater does not migrate beyond the site boundaries.

Impacts to the community are minimized through the use of this alternative. Some operations at the metal recycling facility may be suspended during the implementation of this alternative; however, following remediation, activities may resume and should not be restricted.

The cap which is produced from the stabilized soil and asphalt will be able to support driving and operation of light equipment. Large structures may be placed if support piling is included. Land use restrictions will ensure that placement of any such support is done in such a way that 1) any contaminated soil brought to the surface during placement is handled in accordance with RCRA and state hazardous waste regulations, and 2) the integrity of the cap in maintained.

The selected remedy will also meet all substantive laws and regulations of other ARARs. These are listed and their application is briefly described in the FS.

The law and regulations of concern include:

- Resource Conservation and Recovery Act (RCRA, 42 USC 6901); RCRA regulations (40 CFR 261 to 280); Washington State Dangerous Waste Regulations (WAC 173-303); Minimum Functional Standards for Solid Waste Handling (WAC 173-304).

- The selected remedy prevents further spread of groundwater contamination and constitutes a Corrective Action Program as specified in 40 CFR 264, and WAC 173-303-645(11).

- Safe Drinking Water Act (SDWA, 42 USC 300); Primary Drinking Water Standards (40 CFR 141).

- Clean Water Act (CWA, 33 USC 1251); National Pollution Discharge Elimination System (NPDES, 40 CFR 122); NPDES Permit Program (WAC 173-220).

The final selected remedy meets the requirements of cost-effectiveness as this alternative provides for permanent treatment, and contaminant release minimization for a cost significantly less than other alternatives exhibiting a similar level of protection. The estimated present worth of the selected remedy is $3.4 million, while alternatives 15, 16, 18, and 19, provide similar levels of protection for costs of $8.1, $93.1, $133.1, and $242.9 million, respectively. Additional cost of these is the result of the use of more costly technologies such as incineration (15, 19) or the excavation of larger volumes of soils coupled with off-site landfilling (16, 18).

APPENDIX B to Consent Decree Between
the United States of America and
Washington Natural Gas Company in C89-155TB

STATEMENT OF WORK

WASHINGTON NATURAL GAS COMPANY

TACOMA TAR PITS

TACOMA, WASHINGTON

I. INTRODUCTION/GENERAL REQUIREMENTS

This document sets forth the Statement of Work (SOW) for implementing the December 30, 1987 Record of Decision (ROD) for the Tacoma Tar Pits site in Tacoma, Washington, in accordance with the Consent Decree to which this SOW is attached. It shall be the responsibility of the Washington Natural Gas Company (WNG) to prepare, submit for approval, and fully implement work plans for incorporating each element of this SOW.

II. DESCRIPTION OF THE REMEDIAL ACTION

The major components of the Remedial Action for the Tacoma Tar Pits site that shall be designed and implemented by WNG are outlined below. These measures are more fully described in the Framework for Remediation, dated September 23, 1991 and the various work plans dated May 1990, which plans will be modified to be consistent with the ROD, Framework for Remediation, and this SOW. These documents will comprise the Remedial Design Work Plan and will be incorporated into the consent decree.

A. Excavate (to a depth of 3 feet) and treat (stabilize) materials in the Ponds, Fluff, and Tarpit/Boil Areas, place imported clean fill in the excavated area to an elevation above the post-remediation seasonally high water table, place treated material on top of the imported fill and install a low-permeability asphalt cover.

B. Excavate and treat material in Simon's Operating Area West which exceeds the ROD soil quality criteria to a depth of 3 feet. Place imported fill to above the post-remediation seasonally high water table, deposit the treated material on top of the fill and install a low permeability asphalt cover or other cover of equivalent materials of construction which shall be designed and constructed to be suitable for current or reasonably anticipated use of this area.

C. Excavate and treat hot-spots in Area C (Simon's Operating Area East) as described in the Framework for Remediation, place clean imported fill in the excavated hot-spot locations and install a low permeability asphalt cover or other cover of equivalent materials of construction, which shall be designed and constructed to be suitable for current or reasonably anticipated use of this Area. This cover shall be designed for all of Area C and shall not be limited to the hot spot excavations. Treated material would be deposited in the Ponds, Fluff, Tarpit/Boil Areas and/or Simon's

Operating Area West as determined to be appropriate for the contamination contained therein.

D. Excavate and treat hot-spots in the Peripheral Areas as described in the Framework for Remediation and place treated material in the Ponds, Fluff and/or Tarpit/Boil Areas. Fill the excavations with clean imported fill and grade the areas to promote drainage away from the Site.

E. Install a storm water drainage system to intercept, collect and route runoff off-Site from the covered areas to reduce the amount of groundwater recharge. The drainage system shall be designed consistent with acceptable engineering practices and of sufficient capacity to meet a 25 year, 24 hour rain storm event.

F. Excavate and treat any material discovered during Site remediation activities designated as Extremely Hazardous Waste (EHW) due to PAHs as described in the Framework for Remediation. If it is determined that treatment of EHW is not practical or that treatment cannot be accomplished adequately to allow onsite disposal, then WNG will dispose of this material in a manner and on a schedule approved by EPA.

G. Deed restrictions and/or restrictive covenants to protect the integrity of the cleanup remedy and limit land and groundwater use shall be implemented according to a time frame provided by EPA.

H. Maintain surface and ground water monitoring systems, and monitor Site conditions, including but not limited to water quality to assess the potential for off-Site contaminant migration.

I. Maintain the drainage and maintain the cover to insure cap integrity and protect against normal degradation.

J. A groundwater pump and treat system may be required based on the results of post-remediation groundwater monitoring.

III. PERFORMANCE STANDARDS

The Remedial Action shall be completed subject to the following standards of performance.

1. Soils (smaller than 1-1/2 to 2 inches in size), sediments and tarry materials in the Ponds and Tarpit/Boil Areas will be excavated to a depth of 3-

feet and will be treated using a mixture demonstrated during the Batch Plant Demonstration or during subsequent treatability testing approved by EPA.

2. Any material designated as an EHW for this Site defined as exceeding 1 percent total PAHs as set forth in WAC 173-303-110(3)(a)(vi) will be excavated and treated using the same mixture described in items 1 and 3 of this section.

3. The mixture used to treat the materials excavated from the Ponds and Tarpit/Boil Areas and any EHW material will result in a product with the following physical and preliminary leaching characteristics. These preliminary leaching characteristics set the maximums for these parameters, using a general DAF of 13, but final criteria will be developed during the design phase which will be based on the final Batch Plant Demonstration Report, a final DAF Report, consideration of attenuation characteristics of the ROD parameters, and available bench scale data. The final criteria will be set considering the ROD values as clean up goals for leachability.

Permeability	-	less than 10-7 cm/sec	
Unconfined Compressive Strength	-	minimum 50 psi	
Durability	-	less than 5% loss of mass or dimensional stability	
Leachability	-	Lead	650 ug/l
		PCBs	2.6 ug/l
		ROD PAHs(total)	390 ug/l
		ROD PAHs (ind)	65 ug/l
		Benzene	500 ug/l

4. Soils which exceed the ROD criteria (lead-166 mg/kg; PCBs-1 mg/kg; PAHs-1 mg/kg; and benzene-56 mg/kg) from the Simon's Operating Area West will be excavated to a depth of up to 3 feet and be treated as discussed in Item 7 below.

5. Soils in the Peripheral Areas will be excavated as described in the Framework for Remediation to meet the following criteria:

   - Surface soils and soils within a depth of 3 feet shall not exceed the ROD criteria (see item 4) based upon the geometric mean for lead and arithmetic average for PCBs, PAHs and benzene in each Peripheral Area.

- The maximum concentrations for the ROD parameters will not exceed 2-times the Method A Soil Cleanup Levels - Industrial Soils listed in WAC 173-340-745(2)(a)(i).

6. Hot-spot soils in Area C will be excavated and treated as described in the Framework for Remediation. Simon's Operating Area East (Area C) hot-spots are defined as follows:

   - Lead >4,000 mg/kg
   - PCBs >50 mg/kg
   - ROD PAHs >113 mg/kg

7. Soils (less than 1 1/2 to 2 inches in size) from Simon's Operating Area West, and hot-spots in Simon's Operating Area East (Area C) and Peripheral Areas will be treated using Portland Cement and possibly other additives to create a roller compactable soil cement as demonstrated based on the results of additional batch scale testing. The product of this treatment process will have the preliminary characteristics listed below. These preliminary leaching characteristics set the maximum values for these parameters using a general DAF of 100, but final criteria will be developed during the design phase based on results of Batch Plant and or Bench scale data, consideration the attenuation characteristics of the ROD parameters, and the final DAF report. The final criteria will be set considering the ROD values for these parameters as the clean up goals for leachability.

Unconfined Compressive Strength	-	minimum 50 psi	
Leachability	-	Lead	5000 ug/l
		PCBs	20 ug/l
		ROD PAHs(total)	3,000 ug/l
		ROD PAHs (ind)	500 ug/l
		Benzene	500 ug/l

8. The Fluff will be excavated to a depth of 3 feet. Fluff will be treated using a standard fluff treatment technology (e.g. Lopat or equivalent) as demonstrated by bench-scale testing. The product of this treatment process will meet the preliminary and final leachability requirements as described in Item 7 above.

9. Confirmatory sampling of the sidewalls and bottoms (if excavation is less than 3 feet in depth) will be conducted to assess whether the cleanup criteria for Area C and Peripheral Areas is met. A plan to complete

the confirmatory sampling will be prepared using the general considerations in the Framework for Remediation for review and approval by EPA.

10. All excavations will be backfilled with clean preexisting fill greater than 1 1/2 to 2 inches in size and clean imported structural fill as required.

11. Treated materials will be deposited above the seasonally high water table in the Ponds, Fluff, Tarpit/Boil Area and Simon's Operating Area West.

12. The Ponds, Fluff, Tarpit/Boil, and Simon's Operating Areas (West and East) will be graded to promote drainage and be covered with an asphalt cover having a low permeability. The Operating Area areas will be designed and constructed to be suitable for current or reasonably anticipated use. The remaining areas will be designed to accommodate vehicle traffic and other operations necessary to accomplish maintenance.

13. A drainage system will be installed to intercept, collect and route runoff off-Site.

14. Groundwater and surface water monitoring will continue as described in the Framework for Remediation. If, after remediation, the groundwater criteria are exceeded at the site boundary using the procedures in the Framework for Remediation, a pump and treat system will be designed and a plan (including a schedule) will be submitted to EPA for review and approval. After approval by EPA the plan will be implemented by WNG.

15. Detailed Site-specific sampling, analysis and quality assurance/quality control procedures that have been reviewed and approved by EPA shall be implemented prior to, during and after the remediation, to ensure that the remedial action performance standards are met.

IV. ACCURACY AND COMPLETENESS

A. WNG shall assume all responsibility for the accuracy and completeness of the design work and services for the described project. WNG will be responsible for the correction of any design errors or deficiencies.

B. It shall be the responsibility of WNG to check and coordinate all project data prior to all submittals. Deficiencies, ambiguities, conflicts and inconsistencies shall be rectified prior to submittal of documents. The letter of transmittal shall certify

that all documents have been checked and coordinated prior to submittal and it shall be signed by a responsible authorized representative of WNG.

C. In the event that discrepancies, omissions, or other errors in the drawings and specifications are discovered after the final submission, WNG shall revise the specifications and/or contract drawings or prepare sketches and provide the necessary data required to rectify the problem.

V. EPA APPROVAL

EPA approval of contractors, plans, specifications, processes, and other submittals within the context of consent decree is administrative in nature to allow WNG to proceed to the next task. It does not imply any warranty of performance or that the remedy, when constructed, will meet performance standards or will function properly and be acceptable to EPA.

VI. RESPONSIBILITIES OF PROJECT COORDINATOR:

The WNG Project Coordinator shall oversee the coordination and management of the entire project design and implementation and shall be capable of administering all instructions from EPA, and obtaining answers to all questions from EPA during and after the design work. During the implementation of the work under the consent decree, the Project Coordinator shall keep in close liaison with the EPA Remedial Project Manager (RPM) and the other PRP's (Simons, Burlington Northern Railroad, Hygrade, Union Pacific Railroad, Simchuck/Hansen, City of Tacoma, and Pickering Industries.) as is needed to insure timely implementation of the remedial design.

VII. VERIFICATION OF EXISTING CONDITIONS

WNG is responsible for making the necessary field visits to assess existing conditions and to obtain such detailed information as is required to complete the design. All data shown on drawings shall be verified by the WNG, and WNG shall obtain all data necessary to ensure the complete and proper design of the project.

VIII. CONSISTENCY WITH FEDERAL REQUIREMENTS

All RD/RA activities shall be completed in full compliance with all the Performance Standards in this SOW, and the ROD, shall be not inconsistent with the NCP, and shall be in

compliance with all applicable or relevant and appropriate Federal and State environmental regulations.

IX. REMEDIAL DESIGN WORK PLAN

WNG, EPA and the State have reviewed an existing work plan dated May 1990 ("Remedial Design Work Plan") for the design of the Remedial Action at the Tacoma Tar Pits site. The Remedial Design Work Plan provides for design of much of the remedy set forth in the ROD and shall be modified to be consistent with the Framework for Remediation, in accordance with this SOW. The Remedial Design Work Plan consists of the Framework for Remediation, dated September 23, 1991, and the Work Plan, Sampling and Analysis Plan, Health and Safety Plan, Quality Assurance Plan and the Monitoring Plan, all of which are dated May 1990, and are contained in the Revised Management Plans submitted to EPA on May 25, 1990. The Remedial Design Work Plan, after modifications are made thereto by WNG and are acceptable to EPA, will be incorporated into and become enforceable under the consent decree. The approach to remediation and post-remedial care described in the Work Plan (Sections 3.2, 3.4, 4.1, 12.1) has evolved to the approach described in the Framework for Remediation.

X. REMEDIAL DESIGN

A. Design Reports

WNG shall prepare design analysis reports, construction plans and specifications, and other reports required to implement and monitor the Remedial Actions as defined in the ROD and SOW.

1. Design Plans and Specifications

WNG shall develop clear and comprehensive design plans and specifications including, but not limited to:

a. Design Criteria

Analyses of the design criteria including:

- o Compliance with all applicable or relevant and appropriate environmental and public health standards; and
- o Compliance with Performance Standards.

b. Discussion of the important factors affecting implementation including:

- o Use of currently accepted environmental control measures and technology;

- o The constructability of the design; and

- o Use of currently acceptable construction practices and techniques.

c. Description of assumptions made in the design and detailed justification for these assumptions.

d. Discussion of the possible sources of design error and uncertainty; design limitations and constraints; references to possible operation and maintenance problems.

e. Detailed drawings of the proposed design including:

- o Qualitative flow sheets; and

- o Quantitative flow sheets.

f. Tables listing equipment and specifications.

g. Tables giving material balances.

h. Appendices including:

- o Sample calculations (with at least one example presented and explained clearly for significant or unique design calculations); and

- o Results of laboratory or field tests.

2. Implementation Plan

WNG shall prepare Plans to cover implementation of the Remedial Action. The plans shall be composed of the following elements where applicable:

a. Description of normal operations, including:

- Description of tasks for operation;

- Description of tasks for maintenance;

- Description of prescribed treatment or operation conditions; and

- Schedule of frequency of each maintenance task.

b. Description of potential operating problems, including:

- Description and analysis of potential operation problems;
- Sources of information regarding problems; and
- Common and/or anticipated remedies.

c. Description of routine monitoring and laboratory testing, including but not limited to:

- Description of groundwater and surface water monitoring to be conducted;
- Description of air emissions monitoring;
- Description of required laboratory tests and their interpretation;
- Required data collection, quality assurance plan;
- Schedule of monitoring frequency and, if appropriate, duration of monitoring; and
- Description of how monitoring results may trigger additional action.

d. Description of alternate procedures, including:

- Alternate procedures to prevent undue hazard if systems fail; and
- Analysis of vulnerability and additional resource requirements if a failure occurs.

e. Safety Plan, including:

- Description of precautions, equipment, etc. for Site personnel; and
- Safety tasks required in the event of systems failure.

f. Description of equipment, including:

- Equipment identification;
- Installation of monitoring components;
- Maintenance of Site equipment; and
- Replacement schedule for equipment and installed components.

g. Records and reporting mechanisms required, including:

- Daily operating logs;
- Laboratory records;
- Records for operating costs;
- Mechanism for reporting emergencies;
- Personnel and maintenance records; and
- Monthly reports to EPA.

3. Operation and Maintenance Plan

WNG shall prepare an Operation and Maintenance (O&M) Plan to cover long term operation and maintenance of the Remedial Actions. The plan shall be composed of the following elements where applicable:

a. Description of normal O&M, including:

- o Description of tasks for operation;
- o Description of tasks for maintenance;
- o Description of prescribed operation conditions; and
- o Schedule of frequency of each O&M task.

b. Description of potential operating problems, including:

- o Description and analysis of potential operation problems;
- o Sources of information regarding problems; and
- o Common and/or anticipated remedies.

c. Description of routine monitoring and laboratory testing; including:

- o Description of groundwater and surface water monitoring to be conducted, including sampling and analysis for lead, PCBs, PAHs and benzene;
- o Description of required laboratory tests and their interpretation;
- o Required Data Collection, Quality Assurance Plan;
- o Description of regularly scheduled inspections of the monitoring well network, surface water controls, the landfill cap and any other permanent systems;
- o Description of maintenance schedules and how repairs will be triggered by results of inspections;
- o Schedule of monitoring frequency and, if appropriate, duration of monitoring; and
- o Description of how groundwater and surface water sampling results may trigger additional action.

d. Description of alternate O&M, including:

- o Alternate procedures to prevent undue hazard if systems fail; and
- o Analysis of vulnerability and additional resource requirements if a failure occurs.

e. Corrective Action, including:

- o Description of corrective action to be implemented if groundwater or surface water standards are exceeded; and
- o Schedule for implementing these corrective actions;

f. Safety plan, including:

- o Description of precautions, equipment, etc., for Site personnel; and

- o Safety tasks required in the event of systems failure.

g. Description of equipment, including:

- o Equipment identification;
- o Installation of monitoring components;
- o Maintenance of Site equipment; and
- o Replacement schedule for equipment and installed components.

h. Records and reporting mechanisms required, including:

- o Laboratory records;
- o Records for operating costs;
- o Mechanism for reporting emergencies;
- o Personnel and maintenance records; and
- o Annual reports to EPA.

4. Project Schedule

WNG shall develop a detailed Project Schedule for construction and implementation of the Remedial Action which identifies timing for initiation and completion of all critical path tasks. WNG shall specifically identify dates for completion of the Remedial Action and major interim milestones. This schedule shall be consistent with the schedule contained in the Framework for Remediation dated September 23, 1991 (Remedial Action/Remedial Design Schedule.

5. Construction Quality Assurance Project Plan (CQAPP)

WNG shall develop a construction quality assurance program to ensure that the Remedial Action meets all design criteria, plans and specifications. At a minimum, the CQAPP shall include:

a. A full description of the responsibilities and authority of all entities, and key personnel thereof, involved in Remedial Action construction;

b. Inspection Activities, including:

The observations and tests used to monitor the construction and/or installation of the components of the Remedial Action shall be summarized in the CQAPP which shall include the scope and frequency of each type of inspection. Inspections must: 1) verify compliance with environmental requirements, and include records such as air quality and emissions monitoring records, waste disposal records (e.g., transportation manifests), etc; and 2) ensure compliance with all health and safety requirements and procedures;

c. Sampling Requirements, including:

All sampling and data gathering methods to be used must be described in detail, including sampling activities, sample size, locations, frequency of testing, acceptance and rejection criteria, and plans for correcting problems. Such methods provide the bases for ascertaining whether the performance standards have been achieved by the Remedial Action;

e. Documentation, including:

Reporting requirements for Quality Assurance Analysis activities must be described in detail, including daily summary reports, inspection data sheets, problem identification and corrective measures reports, design acceptance reports, and final documentation. Provisions for the final storage of records must be made.

6. Contingency Plan

This plan must address issues affecting the local population in the event of an accident or emergency at the Site. It incorporates an Air Monitoring Plan and a Spill Control and Counter Measures Plan, if applicable. A preliminary list of items that must be contained in the Contingency Plan include:

a. Name of the person responsible for responding in the event of an emergency;

b. Plan and time frame for meeting with the local community, including local, state, and federal agencies involved in the cleanup, as well as local emergency unit and hospitals;

c. First aid and medical information including names of personnel trained in first aid, clearly marked map with the locations of medical facilities, all necessary emergency phone numbers, fire, rescue, local hazardous material teams, and National Emergency Response Team;

d. An Air Monitoring Plan

This plan will detail requirements for air monitoring both on-Site and at Site perimeters. The chemical constituents identified in the risk assessment should be the basis for atmospheric pollutant sampling and measurement. Air monitoring may include personnel monitoring, on-Site and/or off-Site area monitoring, and perimeter monitoring. Trigger concentrations to implement the Contingency Plan should be specified; and

e. A Spill Control and Countermeasures Plan

This plan must describe in detail contingency measures for potential spills and discharges from material handling and/or transportation, including the methods, means, and facilities required to prevent contamination of soil, water, atmosphere, uncontaminated structures, equipment or material from the discharge of wastes due to spills; and the equipment and personnel to perform emergency measures required to contain any spillage, and to decontaminate and/or remove and properly dispose of any media, structures, equipment, or material that becomes contaminated due to spillage, accident, or other means.

7. Performance Monitoring and Evaluation Plan

Performance monitoring and evaluation procedures for construction and implementation of the Remedial Action. This plan must identify the parameters to be monitored to ensure that performance standards identified in the ROD and SOW are being met.

B. Design Phases and Reviews

The Remedial Design Work Plan, as may subsequently be approved by EPA, shall be implemented by WNG in accordance with the Remedial Design/Remedial Action Schedule contained therein. Such implementation shall include EPA review and/or approval of plans, specifications, submittals, and other deliverables in accordance with Section XII of the Consent Decree. The design documents shall be submitted to EPA at three phases during preparation:

1. Preliminary Design Submittal (30% Design)

The Preliminary Design shall be submitted when the design effort is approximately 30% complete. The preliminary design shall reflect a level of effort such that the technical requirements of the project have been addressed and outlined, and may be reviewed to determine if the final design will provide an operable and functional Remedial Action. This submittal should consist of the following:

a. Design Criteria;

b. Field Sampling Results;

Results of any additional field sampling to determine the extent of the remediation areas.

c. Preliminary plans, drawings, sketches reflecting organization of the containment, pretreatment and treatment systems;

d. Outline of required specifications;

These should reflect the organization of the final specifications

e. Preliminary construction schedule; and

f. Project Delivery Strategy

Items to be addressed include procurement method and contracting strategy, phasing alternatives, review requirements, and contractor and equipment availability concerns.

2. Phase II and III Intermediate Design Submittal (60%Design)

An Intermediate Design Submittal shall be submitted at completion of approximately 60% of the design effort for Phases II and III. It will consist of a continuation and expansion of the Preliminary Design submittal. Any value engineering proposals will be identified and evaluated at this submittal.

3. Pre-Final/Final Design Submittal (95%/100%)

The Final Design documents shall be submitted in two stages for Phase I and Phases II/III. The first shall be a submission of the 95% Remedial Design, i.e., a completed design which has not been reviewed or approved by EPA. The second stage or Final Remedial Design shall incorporate EPA comments and revisions.

The pre-final (95%)/final design submittal will include, at a minimum, the project drawings and construction specifications needed to remediate the Site. The specifications that will be produced will include (1) Site clearing, excavation, and backfill (including contort of runoff, runon, and demolition method and disposal), (2) stabilization processes; (3) asphalt paving; (4) concrete and miscellaneous materials; (5) process equipment (screens, tanks, bins, conveyors, pumps, air pollution control, piping and the like); (6) dust, erosion and sedimentation control, and (7) drainage. The drawings will provide sufficient

detail such that all labor, materials, tools and equipment necessary for the proper execution of the contract will be clearly identifiable. The drawings that will be produced include: (1) overall plot plans; (2) excavation plan(s) and sections (showing limits of work areas, cut and fill details, slopes, etc.); (3) processing areas and details (screening and processing area, temporary stockpiles, water storage tank, reagent and cement storage, and feed facilities) including elevations, general arrangement, and necessary specialized equipment construction drawings; (4) miscellaneous foundations and form construction details; (5) stabilized soil cap and asphalt paving details; (6) Final grading plan and details; (7) paved surface drainage details; (8) peripheral site drainage details; and (9) other miscellaneous drawings.

XI. REMEDIAL ACTION WORK PLAN

The Remedial Action Work Plan will provide detailed plans and schedules for implementation of the Remedial Action in accordance with the Remedial Design, Remedial Design/Remedial Action Schedule, and the consent decree and attachments thereto. It will contain, at a minimum, the following:

1. A description of the work and field operations;

2. Identification of the Remedial Action Team for construction management, including the key personnel, descriptions of duties, and lines of authority;

3. Identification of the Remedial Action construction forces if the construction is to be accomplished by WNG "in-house" resources; or a plan for the qualification and procurement of the Remedial Action Constructor if the constructor is to be obtained through a construction contract;

4. A description of the roles and relationships of the , Project Coordinator, Remedial Design Professional, and the Remedial Action Constructor;

5. A plan for the administration of construction changes to include EPA review of changes that may impact the implementation of the Remedial Action in accordance with the consent decree and attachments thereto;

6. Construction Schedules for requests for proposals and bids, selection of the Remedial Action Constructor, contracting for the Remedial Action and construction of the Remedial Action;

7. A plan for identifying and complying with applicable permitting requirements and environmental statutes;

8. A plan for implementing the Quality Assurance Project Plan, Contingency Plan, Performance Monitoring and Evaluation Plan and Operation and Maintenance Plans; procedures and plans for the decontamination of equipment and disposal of contaminated materials;

9. A Health and Safety Plan for field construction activities which conforms with all applicable federal and state occupational safety and health requirements as set forth in the NCP; and

10. Requirements for project closeout.

XII. REVIEW AND APPROVAL OF REMEDIAL ACTION CONSTRUCTOR

Prior to initiation of any construction activities, WNG shall submit the name and qualifications of the Remedial Action Constructor for approval by EPA. Whether the constructor is obtained by way of a construction contract or through the assignment of "in-house" resources, the information submitted will include sufficient detail to allow EPA to make a full and timely evaluation. Approval will be based on professional and ethical reputation, previous similar experience, and demonstrated capability to perform the required construction activities.

The Remedial Action Constructor may be the same as the Remedial Design Professional.

XIII. REVIEW AND APPROVAL OF THE CONSTRUCTION QUALITY CONTROL PLAN

Prior to commencing Remedial Action, WNG will submit a Construction Quality Control Plan prepared by the Remedial Action Constructor which is indicative of the scope and complexity of the work and all project requirements. The Remedial Action Constructor is responsible for all activities necessary to manage, control, and document work to ensure compliance with all plans and specifications. This plan is the Remedial Action Constructor's management tool and shall include;

1. A description of all quality control personnel, including names, qualifications, duties, responsibilities, and all lines of authority;

2. A copy of a signed letter describing the duties, responsibilities and delegations of authority of the quality control manager;

3. Quality control inspection criteria, including frequency and specific content of inspections;

4. Control testing procedures for each specific test, including proof that personnel and laboratories performing tests are qualified, and that equipment and procedures used comply with applicable standards;

5. Procedures for scheduling and managing submittals, including those of subcontractors, off-Site fabricators, suppliers, and purchasing agents; and

6. Reporting procedures, including frequency of reports and report formats.

XIV. CONSTRUCTION CONFERENCES

1. Pre-Construction Conference

Prior to the start of construction, WNG will initiate a pre-construction conference to include the Project Coordinator, EPA RPM, designated EPA Oversight Officials, Remedial Design Professional, and Remedial Action Constructor.

The purposes of the conference will be to:

a. Establish relationships among all parties, including lines of communication, lines of authority, and scope of work;

b. Review methods for documenting and reporting inspection data;

c. Review methods for distributing and storing documents and reports;

d. Review work area security and safety protocols;

e. Discuss any modifications of the construction quality assurance plan to ensure that Site-specific considerations are addressed; and

f. Conduct a Site reconnaissance to verify that the design criteria, plans, and specifications are understood, and to review material and equipment storage locations.

The pre-construction inspection and meeting shall be documented and minutes of such meeting shall be transmitted to all parties.

2. Pre-Certification Inspection

Upon notification of project completion, EPA will conduct a pre-certification inspection of the entire Site to determine whether the project is complete, all aspects of the approved plans and specifications have been implemented, and the remedy is operational and functional. A Pre-certification Inspection Report shall outline any outstanding construction items noted, actions required to resolve such items, including completion schedule(s), and a date for final inspection if required. This may also include a demonstration that performance standards have been met.

If no additional inspection is required, EPA may certify the remedy in accordance with Section XV of the consent decree.

3. Final inspection (if required)

Upon notification of completion of any outstanding construction items, EPA will conduct a final inspection. The Pre-certification Inspection Report will be used as a checklist with the Final inspection focusing on the outstanding construction items.

If no additional inspection is required, EPA shall certify the remedy in accordance with Section XV of the Consent Decree.

XV. PROJECT CLOSEOUT REPORT

At the completion of the Remedial Action and EPA inspection, WNG shall prepare a Project Closeout Report which certifies that all RD/RA items contained in the consent decree and attachments and any incorporated documents (e.g., plans and specifications) have been completed, and that the remedy is operational and functional. The report shall include, but not be limited to:

a. Synopsis of the Remedial Action and certification of the design and construction;

b. Explanation of any modifications to the plans and why these were necessary for the project;

c. Listing of the performance standards, criteria, and other requirements established before the

Remedial Action was initiated, for judging its functioning and an explanation of any failures to attain these criteria;

d. Results of facility monitoring, indicating the Remedial Action will meet or exceed the performance standards;

e. Explanation of the operation and maintenance (including monitoring) to be undertaken; and

f. "Record Drawings" of the Project ("As Builts").

XVI. RD/RA PROGRESS REPORTS

The WNG shall provide EPA with signed monthly progress reports during the design and construction activities, and annual progress reports during the long-term operating and maintenance period following treatment. Progress reports shall be prepared in letter format with the following headings:

PROGRESS REPORT

SITE NAME:

PREPARED BY:

REPRESENTING:

DATE:

REPORTING PERIOD:

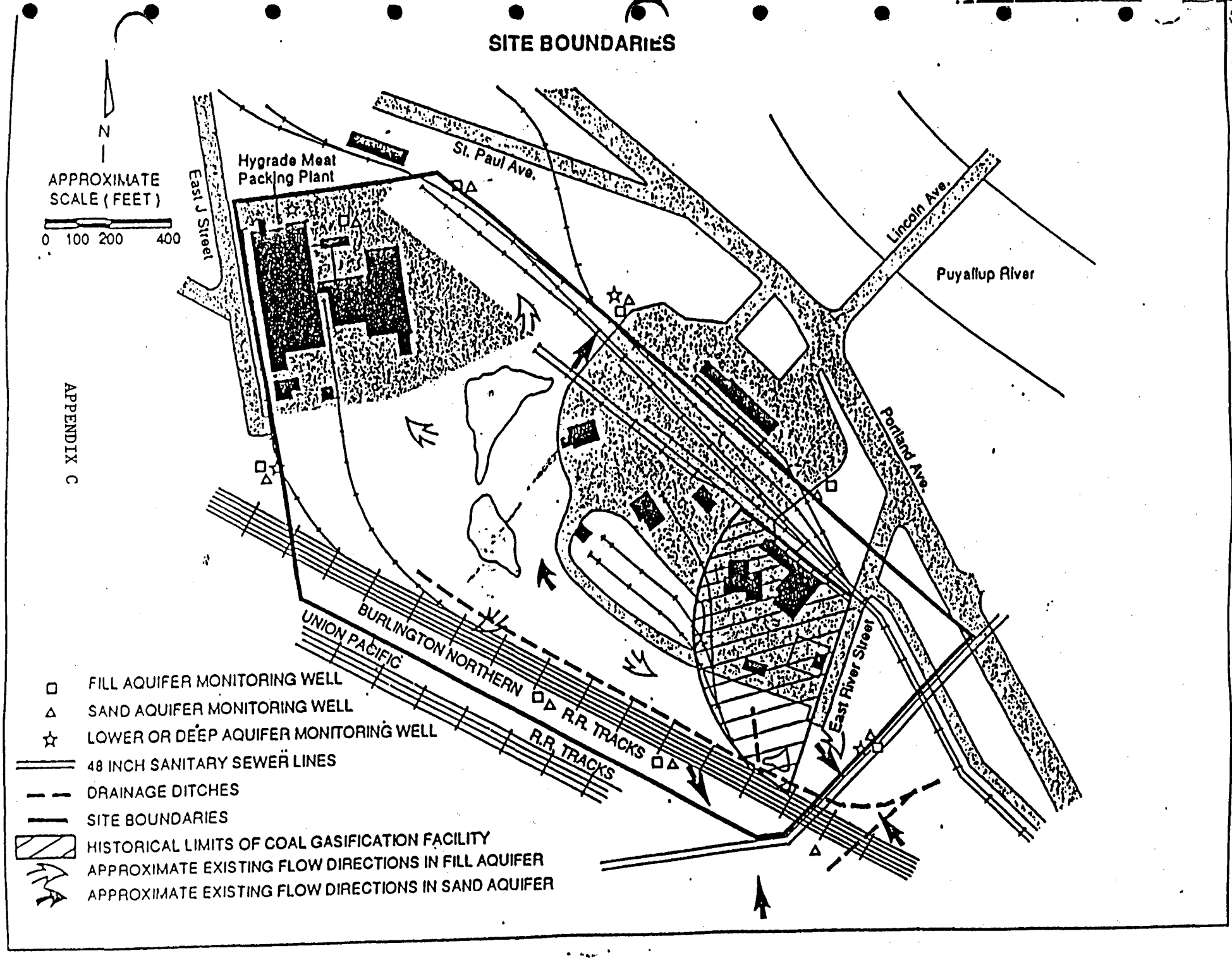
PERCENT COMPLETED: A description and estimate of the percentage of the RD/RA completed;

MONTHLY REPORT: Reports shall include the results of all data generated during the preceding months work, a description of key staffing changes, and detailed explanations of anticipated problem areas and recommended solutions to include technical and scheduling implications.

XVII. RECORD PRESERVATION

WNG shall submit a Records Preservation Report detailing the provisions for final storage of all records, consistent with the requirements in the consent decree.

SITE BOUNDARIES



APPENDIX C

Legal Description Burlington Northern Property

Tacoma Tar Pits

COMMENCING AT THE MONUMENT IN THE INTERSECTION OF "D" STREET AND EAST 18TH STREET, IN THE CITY OF TACOMA, STATE OF WASHINGTON;

THENCE ALONG THE MONUMENTED CENTERLINE OF SAID EAST 18TH STREET NORTH 81°18'11" EAST, 848.71 FEET TO A FOUND MONUMENT AT THE BEGINNING OF A CURVE;

THENCE CONTINUING NORTH 81°18'11" EAST, 1149.6 FEET TO THE CENTERLINE OF BURLINGTON NORTHERN'S "DRAWBRIDGE LINE", BEING THE CENTERLINE OF A 200 FOOT WIDE EASEMENT;

THENCE ALONG THE CENTERLINE OF SAID "DRAWBRIDGE LINE" SOUTH 61°05'06" EAST TO THE INTERSECTION WITH THE PROJECTION OF THE CENTERLINE OF EAST "J" STREET AND THE TRUE POINT OF BEGINNING;

THENCE CONTINUE ALONG SAID "DRAWBRIDGE LINE" SOUTH 61°05'06" EAST TO THE WESTERLY RIGHT OF WAY OF RIVER STREET AND THE TERMINUS OF THIS DESCRIPTION.

F100A293
KJ00501

A parcel of land situate in Section 3, Township 20 North, Range 3 East of the Willamette Meridian, City of Tacoma, County of Pierce, State of Washington, being a portion of Lots 1 through 6, both inclusive, of Block 7146, Lots 1 through 5, both inclusive, of Block 7246 and vacated South 22nd Street, all located in Indian Addition to the City of Tacoma, bounded and described as follows:

Beginning at a point on the westerly line of said Lot 1 of Block 7146 which bears South 20 degrees 41 minutes 53 seconds West, 355.91 feet from the most northerly corner of said Lot 1;

thence along the westerly line of said Lot 1 of Block 7146 and extending across said vacated South 22nd Street and along the westerly line of said Lot 1 of Block 7246, South 20 degrees 41 minutes 53 seconds West, 458.49 feet to a point on the northwesterly line of a parcel of land conveyed by the Union Pacific Railroad Company to the City of Tacoma by Quitclaim Deed, dated October 1, 1951, UPRRCo. L.S. D.A. 2054;

thence along said northwesterly line North 54 degrees 58 minutes 43 seconds East, 345.85 feet;

thence North 26 degrees 52 minutes 58 seconds West, 202.01 feet to the beginning of a curve concave southwesterly having a radius of 438.34 feet;

thence northwesterly along said curve, through a central angle of 07 degrees 38 minutes 37 seconds, 58.46 feet to the Point of Beginning.

Containing an area of 45,088 square feet, more or less (1.035 acres, more or less).

8111100020

TACOMA TAR PITS SITE TRUST AGREEMENT

This agreement, made and effective as of this ____ day of _____, 1991, by and among the party or parties listed on Exhibit A hereby (the "Payor(s)") and _____ (the "Trustee").

WHEREAS, the Payor(s) have executed a Consent Decree with the United States of America ("United States") on behalf of the Administrator of the United States Environmental Protection Agency ("EPA") for the funding of response actions with respect to the facility known as the Tacoma Tar Pits Site located in Pierce County, Washington, and

WHEREAS, the Payor(s) shall deliver to the Trustee pursuant to Section 2.1 of this Agreement the funds described in said Consent Decree; and

WHEREAS, the Payor(s) desires that such funds and other funds subsequently delivered by the Payor(s) pursuant to the terms of this Agreement constitute a Trust Fund, to be held and administered by the Trustee for the purposes hereinafter set forth; and

WHEREAS, the United States has reviewed the terms of this Agreement;

NOW, THEREFORE, in consideration of the promises and of the mutual covenants contained herein, the parties hereto agree

as follows:

ARTICLE I

1. PURPOSE, NAME AND ACCEPTANCE OF TRUST

1.1 Trust Fund Purpose. The purpose of this Trust is to collect and maintain the funds necessary to satisfy costs, obligations, and liabilities other than penalties incurred in connection with this Agreement, the Consent Decree lodged in United States v. Joseph Simon & Sons, Inc., et al., Civil Action No. C90-5373B, consolidated with Burlington Northern Railroad Co. v. Washington Natural Gas Co., et al., Civil Action No. C89-155TB (consolidated) (the "Consent Decree"), and implementation of response actions for the Tacoma Tar Pits Site.

1.2 Name of Trust. The Trust shall be known as the Tacoma Tar Pits Site Trust Fund (the "Trust Fund").

1.3 Nature of Funds. The funds paid by Payor(s) to the Trust are not payments of fines, penalties, or monetary sanctions, nor are they amounts forfeited as collateral posted in connection with a proceeding which could result in imposition of such fines, penalties, or monetary sanctions. Furthermore, the payment of the funds by the Payor(s) shall not be construed as an admission of liability, under the common law or any federal or state statute or regulation, in connection with the Tacoma Tar Pits Site or any other matter.

1.4 Acceptance of Trust and Compensation of Trustee. The Trustee shall be a trust company, bank, or other financial institution in good standing, if there be such an entity willing,

qualified and able to accept the trust upon reasonable or customary terms. The Trustee hereby accepts the trust, duties, obligations, and requirements specifically imposed on it by this Agreement and the Consent Decree, and agrees to carry out and perform, punctually, such duties, obligations, and requirements (and only such duties, obligations, and requirements). No implied duties, obligations, or requirements will be read into this Agreement against the Trustee.

1.5 Compensation of Trustee. The Trustee shall be compensated for its services from the funds paid to the Trust.

ARTICLE II

2. THE TRUST FUND

2.1 Trust Estate and Payor's Obligations. The Trust Estate shall consist of the funds contributed by the Payor(s) to the Trust for the above-stated purposes and all interest and income earned on such funds.

ARTICLE III

3. DISBURSEMENT OF TRUST FUNDS

3.1 Regional Administrator of EPA, Region 10. The Regional Administrator of EPA, Region 10 shall have all authority to advise the Trustee with respect to the payment of obligations and liabilities incurred in connection with the Consent Decree, including implementation and funding of the response actions and payment of government response costs.

3.2 Authority of Regional Administrator. The Payor(s) hereby authorize and the Trustee hereby delegates the power and

duty to the Regional Administrator to take all such action as the Regional Administrator deems necessary or appropriate for the supervision and coordination of the response actions and compliance with terms of the Consent Decree, including disbursement of Trust Funds.

ARTICLE IV

4. TRUSTEE'S POWERS

The Trustee shall have, in addition to those powers specified elsewhere herein and the general powers of the office, the following powers with respect to the Trust Fund, which powers shall be exercised in a fiduciary capacity and upon the advice and concurrence by the Regional Administrator in the best interest of this Trust and for the purposes thereof:

4.1 Payment of Expenses of Administration. To incur and pay any and all charges, taxes, and expenses upon or connected with this Trust or the Trust Fund in the discharge of its fiduciary obligations under this Agreement.

4.2 Preservation of Principal and Investment of Trust Estate. To at all times hold the assets of this Trust in a money market account (or similar interest bearing account) available upon demand. Nothing in this Agreement shall be construed as authorizing the Trustee to carry on with the Trust Estate any business or to divide the gains therefrom. The sole purpose of this Trust is to authorize the investment of the Trust Estate pending use of the Trust Estate for the purposes of the Trust.

4.3 Delegation of Ministerial Powers. To delegate such ministerial powers and duties as it may deem to be advisable.

4.4 Discretion in Exercise of Powers. To do any and all other acts which it shall deem proper to effectuate the powers specifically conferred upon it by this Agreement.

ARTICLE V

5. ACCOUNTS AND RECORDS

5.1 Separate Records to be Kept.

(a) The Trustee shall keep, or direct suitable accountants, if any, to keep, proper books of records and accounts, separate from all other records and accounts, in which complete and correct entries shall be made of all transactions relating to the Trust Fund in accordance with federal governmental accounting procedures and practices.

(b) All books, records, and accounts shall be preserved and retained by the Trustee for at least six years after the completion of the response actions, including operation and maintenance.

ARTICLE VI

6. SUCCESSOR TRUSTEES

6.1 Resignation of Trustee. The Trustee may at any time resign from the Trust hereby created by giving not less than sixty (60) days written notice to the Regional Administrator, and such resignation shall take effect upon the day specified in such notice, unless a successor Trustee shall have been sooner

appointed by the Regional Administrator as hereinafter provided, in which event such resignation shall take effect immediately upon the appointment of a successor Trustee.

6.2 Removal of Trustee. Notwithstanding Section 6.3 hereof, the Trustee may be removed at any time, with or without cause, by a written instrument delivered to the Trustee and signed by the Regional Administrator.

6.3 Appointment of Successor Trustee. In the event that the Trustee hereunder shall resign or be removed, a successor may be appointed by the Regional Administrator by a written instrument signed by such Regional Administrator and delivered to the Trustee. Every successor Trustee shall be a trust company, bank, or other financial institution in good standing, if there be such an entity willing, qualified, and able to accept the trust upon reasonable or customary terms.

6.4 Transfer to Successor Trustee. Every successor Trustee appointed under Section 6.3 above shall execute, acknowledge, and deliver to its predecessor, an instrument in writing accepting such appointment hereunder, and thereupon such successor Trustee, without any further act, deed, or conveyance, shall become fully vested with all the estates, rights, powers, trusts, duties, and other obligations hereunder of its predecessor.

6.5 Merger or Consolidation of Trustee. Any corporation or association into which the Trustee or any successor to it may be merged or converted, or with which it or

any successor to it may be consolidated, or any corporation or association resulting from any merger, conversion, or consolidation to which the Trustee or any successor to it shall be a party, shall be a successor Trustee under this Agreement without the execution or filing of any paper or any other act on the part of any of the parties hereto, notwithstanding anything to the contrary herein.

ARTICLE VII

7. TERMINATION OF TRUST

7.1 Termination of Trust. This Trust shall terminate upon completion of the response actions, including operation and maintenance of the remedy or upon compliance with all terms of the Consent Decree and depletion of all funds in the Trust, whichever occurs first, and the notification of the Trustee of such completion by the Regional Administrator of EPA, Region 10.

7.2 Distribution of Trust Fund Upon Termination. Upon termination of this Trust, the Trustee shall liquidate the assets of the Trust and thereupon distribute the entire remaining Trust Fund, including all accrued, accumulated and undistributed net income, to the Payor(s) and other settling parties in proportion to their respective actual payments to the Trust Fund during the term of the Trust. If any Payor, or its successor, cannot be located within one hundred eighty (180) days after the termination date after diligent effort, its share of the Trust shall be deemed to be waived, and the Trustee shall distribute that share to the Payor and remaining settling parties in

proportion to their respective actual payments to the Trust Fund during the term of the Trust.

ARTICLE VI

8. MISCELLANEOUS

8.1 Particular Words. Unless some other meaning and intent is apparent from the context, the plural shall include the singular and vice versa. Masculine, feminine, and neuter words shall be used interchangeably.

8.2 Conflict with Consent Decree or Appendices. In the event that this Agreement conflicts with any provision of the Consent Decree and/or the Appendices attached to the Consent Decree, the Consent Decree shall control and shall govern this Agreement.

8.3 Governing Jurisdiction. The validity, interpretation, and performance of this Agreement shall be governed by the laws of the State of Washington.

8.4 Irrevocability. This Trust Agreement is irrevocable unless amended by court order, except for ministerial amendments not affecting the substance of the Agreement.

IN WITNESS WHEREOF, the parties hereto have caused this instrument to be executed by persons authorized to sign on their

behalf by signing below as of the day and year first written above.

_____
as Trustee

By: _____
Name:
Title:

By: _____
Name:
Title:

BURLINGTON NORTHERN RAILROAD COMPANY
TEMPORARY LICENSE AGREEMENT PERMITTING ENTRY TO PROPERTY

This agreement ("License Agreement") is entered into this ____ day of _____, 1991, by and between Burlington Northern Railroad Company ("BN"), Licensor, and Washington Natural Gas Company ("Licensee").

WHEREAS, Licensee has requested permission for itself and/or its designated agents/consultants to enter upon BN property; and

WHEREAS, BN is willing to grant temporary license for such entry, subject to the terms and conditions hereinafter set forth.

NOW, THEREFORE, the parties hereto, intending to be legally bound, agree as follows:

1. PERMISSION, LOCATION, AND ACCESS

Subject to the terms and conditions hereinafter set forth, BN grants a temporary license to Licensee and its designated agents/consultants to enter upon the property of BN located in Pierce County, Washington, as more particularly described in Exhibit A attached hereto and incorporated herein, for the sole purpose of carrying out the response actions required by the Record of Decision ("ROD") for the Tacoma Historical Coal Gasification Site ("Site") signed on December 30, 1987 or the Consent Decree between the United States of America and Licensee for the Site ("WNG Consent Decree"), or such additional response actions at the Site as the United States Environmental Protection Agency ("EPA") may require ("Response Actions").

2. LIABILITY

Licensee hereby releases and agrees to protect, defend, indemnify, and save harmless BN, its subsidiaries, officers, employees, and agents against all claims, liabilities, demands, actions at law and equity, judgments, settlements, losses, costs, including attorneys' fees, fines, penalties, damages, and expenses of every character and nature whatsoever (hereinafter referred to collectively as "claims") involving, without limitation, personal injury, including death, suffered or sustained, directly or indirectly, by the officers, employees, and/or agents of BN and its subsidiaries, Licensee and its officers, employees, and/or agents, and all other persons whomsoever, or damage to or contamination, loss or destruction of property of any kind by whomsoever owned, contributed to, resulting from, arising out of, or occurring in connection with the entry or presence of Licensee and its officers, employees, agents and/or consultants on BN property; provided, however, that the scope of this provision shall not extend to claims based solely upon the fact that Licensee or its agents/consultants have conducted scientific tests or analyses at the site pursuant to this License Agreement and that the results of such tests or analyses show that BN or any other person has contributed to contamination at the site; and provided further that Licensee does not indemnify and shall not be liable for injury to or death of BN's employees or agents, or rolling stock belonging to BN or others, or shipments of third parties in the course of

transportation, to the extent such injury, death, or damage is caused by BN's negligence. If any claim covered by this paragraph is asserted, Licensee shall assume, at its own expense on behalf of BN, its subsidiaries, officers, employees, and agents, the defense of any such claims which may be brought against BN and shall pay on behalf of BN the amount of any settlement agreed upon, judgment that may be entered, and any other amounts assessed in connection therewith, plus all costs and expenses.

Licensee agrees to waive any and all statutes of limitation applicable to any controversy or dispute arising out of its work on BN's property for the duration of this License Agreement.

3. INSURANCE

No work of any character shall be started on the property of BN until:

a. An acceptable certificate of insurance specifying that the policy is applicable to the particular work has been furnished to and accepted by BN, naming BN as an additional insured and providing the following insurance coverage:

(i) Worker's compensation and employers' liability insurance and satisfaction of statutory requirements of the state where the property covered by this agreement is located;

(ii) Comprehensive liability insurance with a dollar limitation of coverage not less than a

combined single limit of One Million Dollars ($1,000,000) per any one occurrence for all loss, damage, costs, and expenses, including attorneys' fees, arising out of bodily injury, liability, and property damage liability during the policy period. Such policy shall be endorsed to reflect contractual liability insurance, specifically relating to the indemnity provisions of this agreement and with the exclusion for any activities conducted within fifty feet (50') of railroad tracks deleted; and

(iii) Automobile liability insurance, if applicable, having a combined single limit of One Million Dollars ($1,000,000) per occurrence.

b. All insurance described above shall be maintained until all work carried out hereunder has been satisfactorily completed; provided, however, that upon completion of remediation activities upon BN's property, Licensee may request modification of the amount of insurance required above to cover the continuing ground water monitoring required by the ROD or the WNG Consent Decree.

c. The insurance companies issuing the policies may cancel or make significant changes in the coverage only upon 30 days' notice to BN. It shall be the responsibility of Licensee

to replace such coverage if canceled or if significant changes are made, such that insurance meeting the above requirements remains in force throughout the pendency of Licensee's work on BN property.

d. After BN has advised Licensee that the limits, form, and substance of the insurance policies and certificates are acceptable, said policies and certificates shall be forwarded to the Division General Manager ("DGM"), or his designee, with a copy to the Regional Environmental Engineer ("REE"), as specified in this License Agreement.

e. The acceptance of the insurance by BN is not intended to and shall not reduce, limit, affect, or modify the primary obligations and liabilities of Licensee under the provisions of this License Agreement.

4. ENTRY UPON PROPERTY

Licensee shall notify BN's DGM, or his designee, the REE, and BN's counsel by telephone at least forty-eight (48) hours in advance before entering upon or starting any work upon BN property. The DGM is Mr. L. E. Mueller, (206) 467-3345. If the DGM appoints a designee ("Designee"), the DGM shall notify Licensee of such appointment in writing. The REE is M. L. Burda, (913) 661-4439. BN's counsel is John C. Bjorkman or Jillian Barron, Preston Thorgrimson Shidler Gates & Ellis, (206) 623-7580.

No entry or use of BN's property will be permitted until this License Agreement is signed and permission, in writing, has been received from BN's counsel, the DGM, Designee, and/or REE.

5. BN OPERATIONS

All operations of Licensee shall be carried on in such a manner so as not to interfere with BN property and operations or the use of BN facilities. Licensee shall consult with BN concerning any proposed construction or excavation on BN's property at least seventy-two (72) hours in advance of the commencement of such work. If, in the opinion of the DGM or Designee, conditions warrant at any time, BN will provide appropriate flag service and protection to its property, employees, and customers at the expense of Licensee, and Licensee will pay to BN the full cost and expense thereof within thirty (30) days of receipt of a billing for the flag service.

6. CROSSING OR FOULING TRACKS

In no event shall equipment or material be transported across BN's track without advance notice by telephone of at least forty-eight (48) hours to the DGM or Designee and the DGM's or Designee's permission, so that BN may arrange for the necessary protection at and about the track. Such permission shall be reasonably given by the DGM or Designee. Licensee agrees not to enter upon or foul BN track until given specific permission and signal to do so by a BN flagman, when one is posted.

7. CLEARANCE

All equipment located or material in use upon BN property shall be kept at all times not less than fifty feet (50') from the nearest rail or any track, except for equipment or material necessary for sampling, monitoring or other Response Actions at locations within said fifty feet (50'). Licensee shall give BN's DGM or Designee notice by telephone forty-eight (48) hours prior to entering into said fifty foot (50') area, and shall enter such area only after receiving permission. Such permission shall be reasonably given by the DGM or Designee. Licensee shall conduct its operations so that no part of its equipment shall foul any track, transmission, signal, or communication line or any other structure on the property.

8. MONITORING WELLS

Monitoring wells installed on BN's property shall be constructed and maintained so that their tops are flush with the surrounding grounds and they can withstand vehicle traffic. Each well shall be fitted with a locking top or cover, which shall be kept locked except when Licensee is actually working on the well. At the conclusion of Licensee's work on BN's property, such monitoring wells and any associated apparatus shall be removed and Licensee shall fill and close the wells in accordance with applicable law and regulations.

9. RESTORATION OF PREMISES

Upon completion of the work, Licensee shall remove all machinery, equipment, material, rubbish, and other property of

Licensee and shall leave the property in a condition substantially equivalent to its condition immediately prior to Licensee entering on the property, except to the extent a different condition is required by the ROD, the WNG Consent Decree or by additional terms of Site remediation established by EPA.

10. PROVIDING REPORTS/SPLIT SAMPLINGS

Licensee agrees to provide BN's counsel with a complete copy of any and all documents, reports, analyses, test results, conclusions or recommendations ("documents") relating to Licensee's work on BN's property within ten (10) working days of the generation of such documents. BN shall have the right to designate its own consultant to accompany Licensee's agent/consultant at all times, to photograph Licensee's agent's actions and to obtain split samples of all samples taken.

11. TERM OF LICENSE

Unless modified by agreement of the parties, this License Agreement shall extend until completion of the Response Actions at the Site. Licensee shall notify BN's counsel, the DGM or Designee, and REE when use of the property or work is completed. Under no circumstances shall this License Agreement be construed as granting Licensee any right, title, or interest of any kind or character in, on, or about the land or premises of BN.

12. EFFECT OF AGREEMENT

This License Agreement supersedes all prior license agreements between Licensor and Licensee and/or Licensee's

agents/consultants, including Envirosphere or Ebasco Environmental.

13. APPLICABLE LAW

Licensee agrees that the laws of the State of Washington shall apply to this License Agreement.

IN WITNESS WHEREOF, the parties hereto have caused this License Agreement to be executed as of the date first above written.

WITNESS:

By_____

Dated: _____

BURLINGTON NORTHERN RAILROAD COMPANY

By_____

_____
Address

_____
Title

WITNESS:

By_____

Dated: _____

WASHINGTON NATURAL GAS COMPANY

By_____

_____
Address

_____
Title

Legal Description Burlington Northern Property

Tacoma Tar Pits

COMMENCING AT THE MONUMENT IN THE INTERSECTION OF "D" STREET AND EAST 18TH STREET, IN THE CITY OF TACOMA, STATE OF WASHINGTON;

THENCE ALONG THE MONUMENTED CENTERLINE OF SAID EAST 18TH STREET NORTH 81°18'11" EAST, 848.71 FEET TO A FOUND MONUMENT AT THE BEGINNING OF A CURVE;

THENCE CONTINUING NORTH 81°18'11" EAST, 1149.6 FEET TO THE CENTERLINE OF BURLINGTON NORTHERN'S "DRAWBRIDGE LINE", BEING THE CENTERLINE OF A 200 FOOT WIDE EASEMENT;

THENCE ALONG THE CENTERLINE OF SAID "DRAWBRIDGE LINE" SOUTH 61°05'06" EAST TO THE INTERSECTION WITH THE PROJECTION OF THE CENTERLINE OF EAST "J" STREET AND THE TRUE POINT OF BEGINNING;

THENCE CONTINUE ALONG SAID "DRAWBRIDGE LINE" SOUTH 61°05'06" EAST TO THE WESTERLY RIGHT OF WAY OF RIVER STREET AND THE TERMINUS OF THIS DESCRIPTION.

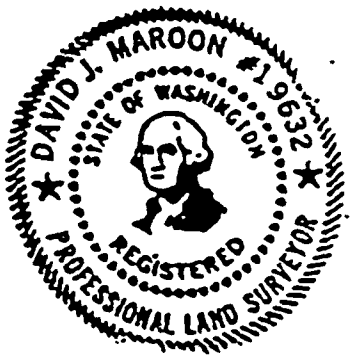


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EXHIBIT A

RIGHT OF ENTRY AGREEMENT

THIS AGREEMENT is made and entered into as of the ___ day of _____, 19___, by and between UNION PACIFIC RAILROAD COMPANY, a Utah corporation (hereinafter the "Railroad"); and WASHINGTON NATURAL GAS COMPANY, a Washington corporation (hereinafter "Licensee" or "WNG").

IT IS MUTUALLY AGREED BY AND BETWEEN THE PARTIES HERETO AS FOLLOWS:

I. DEFINITION OF LICENSEE.

For purposes of this agreement, all references in this agreement to the Licensee shall include the Licensee's contractors, subcontractors, officers, agents and employees, and others acting under its or their authority.

II. RIGHT GRANTED; PURPOSE.

The Railroad hereby grants to the Licensee the right, during the term hereinafter stated and upon and subject to each and all of the terms, provisions and conditions herein contained, to enter upon and have ingress to and egress from the portion of Railroad's property (hereinafter called "premises") in the vicinity of Railroad's Freight House, at or near the intersection of Canal and Lincoln Streets, at Tacoma, Pierce County, Washington, as shown on the attached print dated September 26, 1991, marked Exhibit "B," for the purpose of conducting remediation at the Tacoma Tar Pits Site ("Site") as required by the Consent Decree entered in favor of WNG (hereinafter "WNG's Consent Decree") in Burlington Northern Railroad Co. v. Washington Natural Gas Company, et. al and United States of America v. Joseph Simon & Sons, Inc. et al., U.S.D.C. (W. Dist. Wa.) No. 89-155TB, consolidated with C89-489TB and C90-5373B, (hereinafter "Tar Pits Litigation") including but not limited to the operation of monitoring wells previously installed by Licensee on the premises.

III. TERMS AND CONDITIONS CONTAINED IN EXHIBITS A AND A-1.

The terms and conditions contained in Exhibits A and A-1, attached, are hereby made a part of this agreement.

IV. ALL EXPENSES TO BE BORNE BY LICENSEE; RAILROAD REPRESENTATIVE.

The Licensee shall bear any and all costs and expenses associated with any work performed by the Licensee, or any costs or expenses incurred by the Railroad relating to this agreement. All

work performed by Licensee within 8.5 feet of the centerline of Railroad's tracks located on the premises shall be performed in a manner not inconsistent with Railroad's operations on the tracks and following notice to the Railroad's local Superintendent or his authorized representative (hereinafter the "Railroad Representative") who for the purposes of this agreement shall be:

Raymond Oneida - Manager - Track Maintenance,
402 S. Dawson Street, Seattle, WA 98108
(206) 764-1467.

At the conclusion of its work on the premises, Licensee shall restore the premises to a condition comparable to that existing at the commencement of Licensee's work except to the extent a different condition is required by WNG's Consent Decree or by additional terms of site remediation established by EPA.

V. TERM; TERMINATION.

The grant of right herein made to Licensee shall commence on the date first herein written above, and continue until WNG has discharged Site remediation required by WNG's Consent Decree. In order to terminate its ongoing obligations under this agreement, Licensee shall provide Railroad with written notice of its completion of remedial efforts at the Site and intent to terminate this agreement.

VI. CERTIFICATE OF INSURANCE.

A. Before commencing any work, the Licensee will provide the Railroad with a Certificate issued by its insurance carrier providing the insurance coverage required pursuant to Exhibit A-1 of this agreement in a policy which contains the following endorsement:

> "Union Pacific Railroad Company is named as additional insured with respect to all liabilities arising out of Insured's, as Licensee, performance of any work on the property of the Railroad."

B. Licensee warrants that this agreement has been thoroughly reviewed by its insurance agent(s)/brokers() and that said agent(s)/broker(s) has been instructed to procure insurance coverage and an endorsement as required herein.

C. All insurance correspondence shall be directed to: Union Pacific Railroad Company, General Director - Contracts and Real Estate, Room 1100, 1416 Dodge Street, Omaha, Nebraska 68179.

VII. PROTECTION OF FIBER OPTIC CABLE SYSTEMS.

Fiber optic cable systems may be buried on Railroad's property. Protection of the fiber optic cable systems is of extreme importance since any break could disrupt service to users resulting in business interruption and loss of revenue and profits. Prior to beginning any work, the Licensee shall telephone the Railroad at 1-800-336-9193 (a 24-hour number) to determine if fiber optic cable is buried anywhere on the property set forth herein. If it is, the Licensee shall also comply with and be subject to the provisions contained in Section 6 of Exhibit A.

VIII. ENFORCEABILITY; CHOICE OF LAW; CHOICE OF FORUM.

This agreement shall be governed, construed, and enforced in accordance with the laws of the State of Washington. Litigation arising out of or connected with this agreement may be instituted and maintained in the U.S. District Court for the Western District of Washington at Tacoma or the state courts of Oregon only, and the parties consent to jurisdiction over their person and over the subject matter of any such litigation, in those courts, and consent to service of process issued by such courts.

IX. SPECIAL PROVISIONS.

Licensee shall permit Railroad, upon Railroad's request, access to all reports, data, memoranda, work plans and any other documents related to the Site remediation excepting those documents protected by the attorney-client or work-product privileges.

Licensee shall notify the Railroad Representative of any planned excavation on the premises or planned construction of any temporary or permanent facilities on the premises seventy-two (72) hours prior to commencing such excavation or construction. Railroad shall have the right to consult with Licensee concerning any proposed construction or excavation on the premises.

Monitoring wells installed on the premises shall be constructed and maintained so that the top(s) thereof are built flush with the surrounding grounds, so as not to present a tripping hazard, and shall be constructed so as to withstand vehicle traffic. Each well shall be fitted with a locking top or cover, which shall be kept locked, except when Licensee is actually on the Site working with the well. At the conclusion of the term of this agreement, Licensee shall remove each well and all associated apparatus, and grout or otherwise cause the well shaft to be filled and closed in accordance with any applicable law or regulation.

This agreement also serves to cancel and supersede all prior agreements between the parties concerning access to the premises, provided, however, that any rights or causes of action accrued under such prior agreement shall be retained.

IN WITNESS WHEREOF, the parties hereto have executed this agreement in duplicate as of the date first herein written.

UNION PACIFIC RAILROAD COMPANY

By: _____
Director - Contracts

WASHINGTON NATURAL GAS COMPANY

By: _____
Title: _____

Groce/UPRR/Tacoma/Rt-Entry.Agr

EXHIBIT A

Section 1. NOTICE OF COMMENCEMENT OF WORK - FLAGGING.

The Licensee agrees to notify the Railroad Representative at least 48 hours in advance of Licensee commencing its work and at least 24 hours in advance of proposed performance of any work by the Licensee in which any person or equipment will be within 25 feet of any track, or will be near enough to any track that any equipment extension (such as, but not limited to, a crane boom) will reach to within 25 feet of any track. Upon receipt of such notice, the Railroad Representative will determine and inform the Licensee whether a flagman need be present and whether the Licensee need implement any special protective or safety measures. If any flagmen or other special protective or safety measures are performed by the Railroad, such services will be provided at Licensee's expense with the understanding that if the Railroad provides any flagging or other services the Licensee shall not be relieved of any of its responsibilities or liabilities set forth herein.

Section 2. LIMITATION AND SUBORDINATION OF RIGHTS GRANTED.

(a) The foregoing grant of right is subject and subordinate to the prior and continuing right and obligation of the Railroad to use and maintain its entire property including the right and power of the Railroad to construct, maintain, repair, renew, use, operate, change, modify or relocate railroad tracks, roadways, signal, communication, fiber optics, or other wirelines, pipelines and other facilities upon, along or across any or all parts of its property, all or any of which may be freely done at any time or times by the Railroad without liability to the Licensee or to any other party for compensation or damages.

(b) The foregoing grant is also subject to all outstanding superior rights (including those in favor of licensees and lessees of the Railroad's property, and others) and the right of the Railroad to renew and extend the same, and is made without covenant of title or for quiet enjoyment.

Section 3. NO INTERFERENCE WITH RAILROAD'S OPERATION.

No work performed by Licensee shall cause any interference with the constant, continuous and uninterrupted use of the tracks, property and facilities of the Railroad its lessees, licensees or others, unless specifically permitted under this agreement, or specifically authorized in advance by the Railroad Representative. Nothing shall be done or suffered to be done by the Licensee at any time that would in any manner impair the safety thereof. When not in use, Licensee's machinery and materials shall be kept at least 50 feet from the centerline of Railroad's nearest track, and there shall be no crossings of Railroad's tracks except at existing open public crossings.

Section 4. PERMITS.

Prior to beginning any work, the Licensee, at its sole expense, shall obtain all necessary permits to perform any work contemplated by this agreement.

Section 5. MECHANIC'S LIENS.

The Licensee shall pay in full all persons who perform labor or provide materials for the work to be performed by Licensee. The Licensee shall not permit or suffer any mechanic's or materialmen's liens of any kind or nature to be enforced against any property of the Railroad for any such work performed. The Licensee shall indemnify and hold harmless the Railroad from and against any and all liens, claims, demands, costs or expenses of whatsoever nature in any way connected with or growing out of such work done, labor performed, or materials furnished.

Section 6. FIBER OPTIC CABLE SYSTEMS.

If fiber optic cable is buried anywhere on the Railroad premises to be used by Licensee, the Licensee will telephone the telecommunications company(ies) involved, arrange for a cable locator and make arrangements for relocation or other protection of the fiber optic cable prior to beginning any work on Railroad's premises. In addition to the liability terms elsewhere in this Agreement, the Licensee shall indemnify and hold the Railroad harmless against and from all cost, liability and expense whatsoever (including, without limitation, attorney's fees and court costs and expenses) arising out of or in any way contributed to by any act or omission of the Licensee, its subcontractor, agents and/or employees, that causes or in any way or degree contributes to (1) any damage to or destruction of any telecommunications system by the Licensee and/or its subcontractor, agents and/or employees, on Railroad's property, (2) any injury to or death of any person employed by or on behalf of any telecommunications company and/or its contractor, agents and/or employees, on Railroad's property and/or (3) any claim or cause of action or alleged loss of profits or revenue by, or loss of service by a customer or user of, such telecommunication company(ies).

Section 7. COMPLIANCE WITH LAWS.

In the prosecution of the work covered by this agreement, the Licensee shall comply with all applicable federal, state and local laws, regulations and enactments affecting the work. The Licensee shall use only such methods as are consistent with safety, both as concerns the Licensee, the Licensee's agents and employees, the officers, agents, employees and property of the Railroad and the public in general. The Licensee (without limiting the

generality of the foregoing) shall comply with all applicable state and federal occupational safety and health acts and regulations. All Federal Railroad Administration regulations shall be followed when work is performed on the Railroad's property. If any failure by the Licensee to comply with any such laws, regulations, and enactments, shall result in any fine, penalty, cost or charge being assessed, imposed or charged against the Railroad, the Licensee shall reimburse and indemnify the Railroad for any such fine, penalty, cost, or charge, including without limitation attorney's fees, court costs and expenses. The Licensee further agrees in the event of any such action, upon notice thereof being provided by the Railroad, to defend such action free of cost, charge, or expense to the Railroad.

Section 8. SAFETY INSTRUCTIONS.

Safety of personnel, property, rail operations and the public is of paramount importance in the prosecution of the work pursuant to this agreement. As reinforcement and in furtherance of overall safety measures to be observed by the Licensee (and not by way of limitation), the following special safety rules shall be followed:

(a) The Licensee shall keep the job site free from safety and health hazards and ensure that its employees are competent and adequately trained in all safety and health aspects of the job. The Licensee shall have proper first aid supplies available on the job site so that prompt first aid services can be provided to any person that may be injured on the job site. The Licensee shall promptly notify the Railroad of any U.S. Occupational Safety and Health Administration reportable injuries occurring to any person that may arise during the work performed on the job site. The Licensee shall have a non-delegable duty to control its employees, while they are on the job site or any other property of the Railroad to be certain they do not use, be under the influence of, or have in their possession any alcoholic beverage or illegally obtained drug, narcotic or other substance.

(b) The employees of the Licensee shall be suitably dressed to perform their duties safely and in a manner that will not interfere with their vision, hearing or free use of their hands or feet. Only waist length shirts with sleeves and trousers that cover the entire leg are to be worn. If flare-legged trousers are worn, the trouser bottoms must be tied to prevent catching. The employees should wear sturdy and protective footwear. Employees shall not wear boots (other than work boots), sandals, canvas-type shoes or other shoes that have thin soles or heels that are higher than normal. In addition, the Licensee shall require its employees to wear personal protective equipment as specified by Railroad rules, regulations or Railroad officials overlooking the work at the job site. In particular, the protective equipment to be worn shall be:

(1) Protective head gear that meets American National Standard-Z89.1-latest revision. It is suggested that all hardhats be affixed with Licensee's or subcontractor's company logo or name.

(2) Eye protection that meets American National Standard for occupational and educational eye and face protection, Z87.1-latest revision. Additional eye protection must be provided to meet specific job situations such as welding, grinding, burning, etc.; and

(3) Hearing protection which affords enough attenuation to give protection from noise levels that will be occurring on the job site.

(c) All heavy equipment provided or leased by the Licensee shall be equipped with audible back-up warning devices. If in the opinion of the Railroad Representative any of Licensee's or any of its subcontractor's equipment is unsafe for use on the Railroad's right-of-way, the Licensee, at the request of the Railroad Representative, shall remove such equipment from the Railroad's right-of-way.

Section 9. INDEMNITY.

(a) As used in this Section, "Railroad" includes other railroad companies using the Railroad's property at or near the location of the Licensee's installation and their officers, agents, and employees; "Loss" includes loss, damage, claims, demands, actions, causes of action, penalties, costs, and expenses of whatsoever nature, including court costs and attorneys' fees, which may result from: (a) injury to or death of persons whomsoever (including the Railroad's officers, agents, and employees, the Licensee's officers, agents, and employees, as well as any other person); and (b) damage to or loss or destruction of property whatsoever (including Licensee's property, damage to the roadbed, tracks, equipment, or other property of the Railroad, or property in its care or custody).

(b) As a major inducement and in consideration of the license and permission herein granted, the Licensee shall, to the extent of its own negligence, indemnify and hold harmless the Railroad from any Loss which is due to or arises from any cause and is associated in whole or in part with the work performed under this agreement, a breach of the agreement or the failure to observe the health and safety provisions herein, or any activity or omission arising out of performance or nonperformance of this agreement.

Section 10. RESTORATION OF PROPERTY.

In the event the Railroad authorizes the Licensee to take down any fence of the Railroad or in any manner move or disturb any of the other property of the Railroad in connection with the work to be performed by Licensee, then in that event the Licensee shall, as soon as possible and at Licensee's sole expense, restore such fence and other property to the same condition as the same were in before such fence was taken down or such other property was

moved or disturbed, and the Licensee shall indemnify and hold harmless the Railroad, its officers, agents and employees, against and from any and all liability, loss, damages, claims, demands, costs and expenses of whatsoever nature, arising from the taking down of any fence or the moving or disturbance of any other property of the Railroad.

Section 11. WAIVER OF BREACH.

The waiver by the Railroad of the breach of any condition, covenant or agreement herein contained to be kept, observed and performed by the Licensee shall in no way impair the right of the Railroad to avail itself of any subsequent breach thereof.

Section 12. ASSIGNMENT - SUBCONTRACTING.

The Licensee shall not assign, sublet or subcontract this agreement, or any interest therein, without the written consent of the Railroad and any attempt to so assign, sublet or subcontract without the written consent of the Railroad shall be void. If the Railroad gives the Licensee permission to subcontract all or any portion of the work herein described, the Licensee is and shall remain responsible for all work of subcontractors and all work of subcontractors shall be governed by the terms of this agreement.

Form Approved, AVP-Law

EXHIBIT A-1

Right of Entry Agreement
Insurance Requirements

Licensee shall, at its own sole cost and expense, procure the following kinds of insurance and promptly pay when due all premiums for that insurance. If it so elects, Railroad shall have the right to obtain such insurance and Licensee shall promptly reimburse Railroad for that expense. The following insurance shall be kept in force during the life of this Agreement:

General Public Liability insurance providing bodily injury, including death, personal injury and property damage coverage with a combined single limit of at least $2,000,000 each occurrence or claim and a general aggregate limit of at least $4,000,000. This insurance shall provide Broad Form Contractual Liability covering the indemnity provisions contained in this Agreement, Underground hazard, Products-Completed Operations with products-completed operation aggregate of at least $2,000,000, a separate general aggregate for the project (ISO Form CG 25 03 or equivalent), Broad Form Property Damage, severability of interests and name Railroad as an additional insured with respect to all liabilities arising out of Licensee's obligation to Railroad in the Agreement. If coverage is purchased on a "claims made" basis it shall provide for at least a three (3) year extended reporting or discovery period, which shall be invoked should insurance covering the time period of this Agreement be cancelled.

Automobile Public Liability insurance providing bodily injury and property damage with a combined single limit of at least $2,000,000 each occurrence or claim. This insurance shall provide contractual liability by endorsement ISO Form CA 00 25 or equivalent covering all motor vehicles including hired and non-owned, mobile equipment to the extent it may be excluded from general liability insurance, severability of interests and name Railroad as an additional insured with respect to all liabilities arising out of Licensee's obligation to Railroad in the Agreement.

Worker's Compensation insurance covering the statutory liability as determined by the compensation laws of the state(s) affected by this Agreement and Employers' Liability. Also compliance with all laws of states which require participation in their state workers' compensation fund.

The Licensee hereby waives its right to subrogation, as respects the above insurance policy(ies), against Railroad for payments made to or on behalf of employees of Licensee or its agents and for loss of its owned or leased property or property under its care, custody and control while on or near Railroad's right-of-way or other real property. Licensee's insurance shall be primary with respect to any insurance carried by Railroad.

Licensee shall furnish to Railroad certificate(s) of insurance evidencing the required coverage and endorsement(s) and upon request a certified duplicate original of any of those policies. The insurance company(ies) issuing such policy(ies) shall notify Railroad in writing of any material alteration including any change in the retroactive date in any "claims-made" policies or substantial reduction of aggregate limits, if such limits apply, or cancellation thereof at least thirty (30) days prior thereto.

The insurance policy(ies) shall be written by a reputable insurance company or companies acceptable to Railroad or with a current Best's Insurance Guide Rating of B and Class VII or better. Such insurance company shall be authorized to transact business in the state(s) affected by this Agreement.

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CONTRACTOR'S ENDORSEMENT

A. As a condition to entering upon Licensor's right-of-way to perform work pursuant to this Agreement, Licensee's contractor: _____, of _____ (hereinafter "Contractor") agrees to comply with all the terms and provisions of this Agreement relating to the work to be performed and the insurance requirements set forth in Exhibit A-1.

B. Before the Contractor commences any work, the Contractor will provide the Licensor with a certificate issued by its insurance carrier providing the insurance coverage required pursuant to Exhibit A-1 in a policy which contains the following type endorsement:

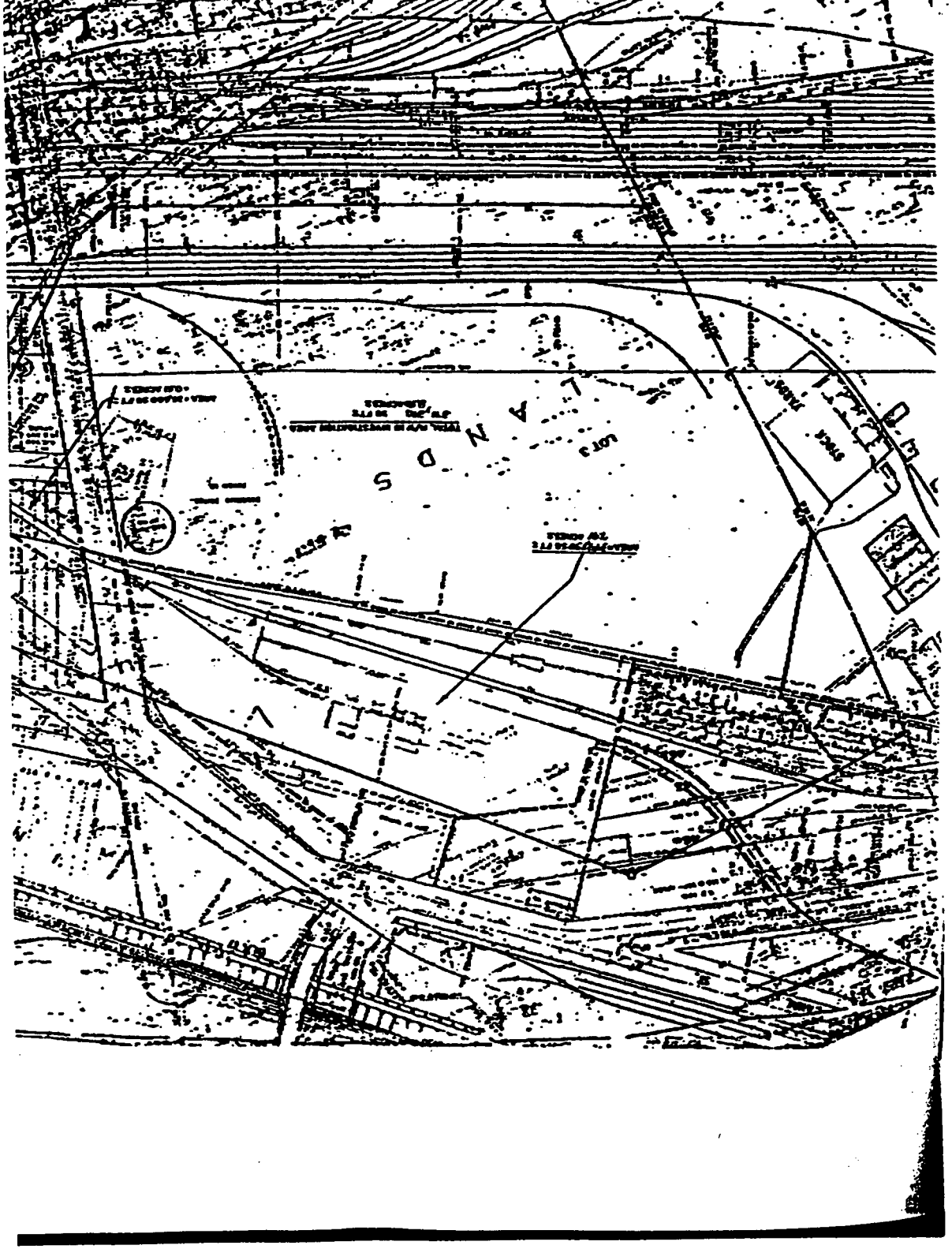
> Union Pacific Railroad Company is named as an additional insured with respect to all liabilities arising out of Insured's performance of work on behalf of the Licensee.

C. All insurance correspondence shall be directed to: J.M. Martin, Room 1100, Union Pacific Railroad Company, 1416 Dodge Street, Omaha, Nebraska 68179.

Witness:

_____
(print contractor's name)

X_____ X_____
By: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